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A RUBBER SYMPOSIUM.

THE Rubber Club dinner is slated for the evening of January 8. On the afternoon of that day there is to be held at the Waldorf a function that bids fair to rival the banquet in trade interest. It is to be a symposium on the pregnant subject of crude rubber. The dominant note will be a discussion of ways and means for assuring to American manufacturers a continuous and controllable supply of this most vital of raw materials. Experts on the subject of wild and plantation rubber, on ocean transportation and kindred subjects will speak. Discussion of these subjects will be open, not only to members of the Rubber Club, but to visitors who are interested. Cards of admission will be issued to those who apply to the secretary of the club. The committee in charge consists of H. Stuart Hotchkiss, William E. Bruyn, and the Editor of THE INDIA RUBBER WORLD.

THE ADVANCE OF THE AMERICAN CHEMICAL INDUSTRY.

MUCH has been heard of late years about the wonderful accomplishments of German chemists. As an object-lesson it has been beneficial, but, unfortunately, there are pessimists who assume that chemical America is standing still. They agree that America showed the way in electricity, in machinery and machine tools, and to-day stands first in methods of efficiency, but they do not know that the United States bids fair to become the world's chemical leader.

The preliminary statement of the Bureau of the Census for American chemical industries, by five-year periods since 1899, shows that the number of establishments increased from 1,785 to 2,461, and the capital invested, from $238,471,290 to a total of $722,988,871 in 1914. The value of the products during these three periods covering 15 years leaped from $202,506,076 to $547,801,937, or 170.5 per cent. Correspondingly there was also a gain of 37.5 per cent in persons engaged and of 144.1 per cent in salaries paid.

The war has stimulated the chemical industry tremendously, and the longer it continues the greater will be the growth. Europe, and indeed America, is awakening to the fact that American chemists already mean to American industry what German chemists have meant to German industry. And it can be said truthfully that industrial chemists in the United States are to-day the equal of any in the world. For years every great manufacturing establishment has had a research laboratory where a corps of skilled chemists worked systematically toward wider knowledge, improved methods and higher standards of efficiency in the product. Germany was not unique in this respect; the chief difference has been that we have taken it as a matter of course and failed to give it proper publicity. Another handicap has been the secrecy and isolation attending much of the chemical investigation of the past; the keen commercial rivalry, characteristic of America, has to an unfortunate extent discouraged comparison of results and coördination of research for the common good.

A step in advance was taken, however, when the chemists of the American rubber trade discussed aging tests at their recent meeting in New York. Not specifically as to the subject chosen, but rather because it showed the absolute willingness of those in charge of some of the biggest and best equipped rubber laboratories to discuss questions of general interest fully and frankly. The key-

note was struck by Dr. Geer when he stated that any problem that affected the customer's interest ought to be regarded as a matter that all could and should debate fully. That there are scores of such questions goes without saying, and that their presentation before a congress of alert, practical, working rubber chemists would result in anything other than great general good is incontrovertible. The rubber chemists have made an excellent beginning. They owe it to themselves and to the trade to go on.

GUAYULE IN THE SOUTHWEST.

RUBBER planting in the United States is in sight at last—at least it looks so. The profitable cultivation of guayule, which had its beginnings with the researches of Professor Francis Lloyd, seems assured. This will mean much to the owners of vast tracts of waste land in the South and West. It promises also to bring into use thousands of acres of irrigated lands once fertile but now exhausted as far as ordinary crops go. It will also be of the greatest value to the American rubber trade, an anchor to the windward, and a practical piece of preparedness.

Para rubber once came only from Brazil. Labor conditions, costly freights, and high taxes started the great Para plantations in the Far East. English enterprise, capital and organization did all this. Guayule rubber is or was an exclusive Mexican product. War, confiscation, banditry, are giving an impetus to guayule planting in the United States. Is it not possible that American enterprise, capital and organization will do for the United States what England did for the British Empire, and that rubber may some day be produced on a large scale under the stars and stripes?

TWENTY MILLION TIRES FOR 1917.

A CONSERVATIVE estimate of next season's tire demands indicates a tremendous increase. Motor cars for both business and pleasure are in greater demand than ever. Most manufacturers are everywhere making new sales records, and the increased interest being shown by the agricultural population is particularly significant. The buying power of the 6,000,000 farm owners of the country promises to become an important factor in the sale of moderate priced cars, for while the wheat yield is below normal, other crops are not far from their best. Indeed, P. J. Calhoun, general sales agent of the Quaker City Rubber Co., who has just returned from the West where he has been compiling statistics regarding the growth of the automobile business, reports that the sale of cars in the Middle West is unprecedented, and that 75 per cent of the cars sold this year has been disposed of in agricultural states. Indiana sales have been double those of 1914; 10,000 cars were sold in Kansas in less than six months. In the three states of Iowa, California and Nebraska the ratio of motor car owners to total population is 1 in 21, 1 in 23, and 1 in 25, respectively; this means that one family in every five or six has a car.

These facts are of great interest as forecasting the probable 1917 tire demand. 1,500,000 new cars will require 6,000,000 tires for original equipment, and as about two-thirds of all motorists carry at least one spare, 1,000,000 more may be counted in. According to the National Automobile Chamber of Commerce 9,000,000 tires were discarded last year. As this represents the tire wear of about 3,400,000 cars, the 1917 replacements on 4,900,000 cars according to the same ratio will reach 12,970,300, which, added to the 7,000,000 already accounted for, makes the colossal grand total of 19,970,300.

THE BRITISH CHEW GUM.

THERE has been in times past a certain polite distress on the part of the cultured European over the American chewing gum habit. To him it was vulgar and offensive, and that it would ever become a British habit, for example, was not to be imagined. Nevertheless, Britons, French and Italians at the front have become devotees of the habit, and civilians are also following their lead. Perhaps it is a pity and perhaps not. Gum chewing is in the abstract no more offensive to non-chewers than is smoking to non-smokers. Moreover, it is a comfort in time of stress, and an aid to digestion. It is affirmed that the Yankee nasal tone has been agreeably modified by this habit. It is also claimed that its effect upon floating aspirates is beneficial. Thus, if a Cockney takes up the habit, instead of dropping an H, the plastic cud holds it firmly in its place, and his English is perfect—so it is said.

RUBBER HAS OFTEN BEEN TERMED A LUXURY. THE sufficient evidence that it is a necessity is found in the fact that less than a month ago Para rubber sold in Berlin at $22.50 a pound.

Proceedings of the "Rubber Section"—Continued.

Two important addresses delivered before the Rubber Section of the American Chemical Society during the September, 1916, Convention were printed in the October issue, followed by three other interesting papers in the November issue. Below is given a summary of the symposium on "The Accelerated Life Test of Rubber Goods," in which some 20 rubber chemists participated, including Dr. W. C. Geer, C. R. Boggs, D. W. Whipple, J. B. Tuttle, P. L. Wormeley, Dr. L. E. Weber and Messrs. Postmontier, Clark, Barrier, Thompson, Pierce, Kimley, Burns, Potts and Saunders.

DR. L. E. WEBER presided, and in introducing Dr. Geer, stated that he was probably the first man in this country to put an accelerated age test to practical use. He emphasized the paramount importance of aging tests for manufactured goods despite the fact that chemists have been carrying out accelerated tests in various ways and with various results, so that whereas some consider them of inestimable value, others claim that no satisfactory accelerated test has yet been devised.

Dr. Geer then spoke briefly regarding his methods, as follows:

The first work done in the laboratories of The B. F. Goodrich Co. on accelerated age tests was in the fall of 1907, at which time a suggestion came to us from Dr. Van der Linde, of the Gutta Percha & Rubber Co., at Toronto, who used a very fast aging test. He performed it upon three small pieces of rubber. The samples to be tested were put in an air bath and heated at about 140 degrees C. for a period of 1, 2 and 3 hours, taken out and examined for cracking, hardening or to ascertain whether it was becoming soft. This method was not parallel with actual aging in any particular and we came to the following: Into an oven, heated air was blown at a temperature of 160 degrees F., the chief care being to add hot fresh air during the desired time. A number of samples 3/32 of an inch in thickness were previously cut and put into this air bath. The air was then started circulating and the test was continued for a period of two weeks, taking out three samples each day. These were allowed to stand for 24 hours until they reached a state of equilibrium, after which they were tested for tensile strength and elongation. The data were plotted in curve form and gave us a time-decay curve of the compound. It is worth while to emphasize the point that we consider this purely a practical, not an ultimate test. It was always run in comparison with a standard compound; that is, at least two sets of samples were tested at the same time. By comparing, then, the curve of a compound the age of which we knew, and the curve of a compound the age of which we did not know, we could tell whether the article would age properly in service.

We have run many thousands of these curves and this method of determining the aging test is reliable, although it undoubtedly can be greatly improved. We find, for instance, that a compound the tensile curve of which falls off more rapidly than that of another compound of the same type will deteriorate more slowly on standing over a period of months or years under room conditions. We now have the results of ordinary aging tests plotted in months, in comparison with the accelerated aging tests plotted in days for the same compound, cured under the same conditions, and we find them quite similar in form.

But compounds differ. There are so many factors entering into compounds that a great deal of judgment is required. Several types of tensile curves have been stated.

The method is of no great value in the lower classes of compounds. It is more valuable in the higher classes; for instance, in such types and compounds as fire hose and articles of that kind. It is a service test designed for compounds that are stored as part of their service. The accelerated aging test is not reliable when applied to compounds designed for special purposes and it is very questionable whether it is at all valuable as a specification test to be applied by the consumer. Its primary value lies in the fact that it is an aid to the compounder in the manufacturing plant to permit him to study the aging of compounds the materials of which he knows. It might be used by consumers as mentioned above for compounds such as fire hose where storage under ordinary conditions plays a large part and where it is necessary that the compound be soft and flexible throughout its life.

W. C. GEER.

D. W. WHIPPLE.

C. R. BOGGS.

These remarks I realize are very incomplete, for it has been impossible for me to find time to write a paper on this subject. My primary purpose in speaking before this meeting is to suggest for your earnest consideration the study of accelerated aging tests in order that it may be possible for the rubber manufacturer to give to the consumer compositions of certain age and thus tend to eliminate from the rubber business the perishable features of rubber compounds.

In answer to questions, during the discussion which followed, Dr. Geer stated that his tests were carried out under air conditions and in the dark. His samples were put in a drawer separated by a sheet of cardboard, and the temperatures given were varying to a certain extent, although the temperature of the room did not ordinarily exceed 95 degrees in summer and never became very cold in winter, as there was continuous heat. Thus the aging tests ran parallel with a reasonable varying de-

gree. Although both an under and an over-cured sample can be tested, an under-cured sample, he said, does not pass the test. The temperature of the oven is a factor.

Later, during the discussion relative to insulated wire, particularly in regard to compounds containing a large amount of accelerator, he expressed the opinion that the temperature of an accelerated aging test would make no difference in the physical results obtained. This is limited by reducing the total amount of sulphur when accelerator is used. By "type of compound" he explained that he meant compositions in relation to tensile strength and physical quality. This life test will show whether the product is going to stand up or not. It is a practical service test to accelerate the conditions which the compounds would have in ordinary use, not compounds subjected to very bright light, nor for articles to be subjected to a great deal of steam.

Regarding a suggestion that the permanent elongation of steam hose may be caused by the cold flow of the water which follows the hot injection of steam while exposed to daylight, Dr. Geer said that, bearing in mind that permanent elongation is dependent somewhat upon tensile, it will be found that after three days of elongation the tensile will have fallen off. If the ratio of the tensile and elongation could be worked out it would indicate what the limit ought to be.

C. R. Boggs then discussed a series of experiments begun seven years ago to determine the value of the various short life tests which had been proposed up to that time:

These tests included various dry heat and steam tests and what is known as the acetone peroxide test. On none of the tests tried did we obtain results which were at all promising. Acetone peroxide certainly does not oxidize rubber in the same manner as air does under ordinary conditions. We then imported a quartz tube mercury vapor light in the hope that the ultra-violet light might cause the natural oxidation, but at a greater speed. Oxidation does take place rapidly, but it is similar to that obtained on a sunracking test rather than that obtained by the natural aging of rubber. The ultra-violet light, therefore, might be used as a standard light for a sunracking test, but not for a life test, as the two tests are not similar by any means.

We had had so many disappointments that when we heard of Dr. Geer's heat test we practically refused to try it. Later, however, we did try it and the results were sufficiently promising so that about three or four years ago we made a comparatively thorough study of it. As we have tested samples regularly which have been exposed to the light and air of an ordinary room after regular intervals of time over the entire life of the samples, we knew what the life of our samples should be and consequently it did not take long to find out that the test was very valuable. We have used the test since then. Duplicate samples of those tested by the Geer test, when kept and tested after ordinary deterioration, showed the same characteristics in practically every case. Samples which, by the Geer test, had shown decrease in tensile but not in ultimate elongation, showed the same thing after natural aging. Other samples which maintained their tensile but decreased in elongation, and still others which increased in tensile, all showed the same results by the two tests. The time in days that corresponds with a certain number of hours of the Geer test varies with different grades of compounds, but does not seriously detract from the value of the test.

There are at present many specifications which call for a definite compound of certain chemical and physical characteristics which are based on the assumption that there exists no reliable short life test and that, therefore, the next best insurance is to demand something which has been known to have had a satisfactory life. When the purchaser has taken this position we have assisted him in trying to see that he obtained what he specified. However, if we have a satisfactory short life test in Dr. Geer's heat test, it would be much better for both the purchaser and manufacturer to use this test. The purchaser would be insured of a permanent compound and the manufacturer allowed to use his ingenuity to advance the art of the trade. It is now time for the purchaser to satisfy himself that the test is what it is claimed to be.

Up to the present time, I have not found any samples which were not correctly represented by the Geer test, but I have lately heard of a compound with an organic accelerator which was said to pass the test, but which did not stand up on natural aging. I am now trying to duplicate this result.

Mr. Boggs later expressed himself of the opinion that the value of the test might increase upon further investigation, adding that most compounds tested by the rapid aging method contained an increased amount of accelerator, and that while successful results are the rule, care must be taken particularly to avoid over-curing.

Mr. Whipple's address carried the discussion a step farther than that of Dr. Geer:

Among the interesting points brought out by Dr. Geer, his discussion of the nature of curves obtained and their interpretation brings to my attention one type of curve which he has omitted, namely, one with an upward tendency from the beginning of the test and not falling below its starting point during the period of the test. Such a curve has been obtained in three instances on tests conducted for Committee D 11. I have not seen the results of the other members of this committee, but if they are in agreement with mine and the curves obtained were to be interpreted in a broad way as indicating service value, it brings out the interesting conclusion that the general run of the code wire is better than the general run of the 30 and 40 per cent grades on the market to-day, as the code wires consistently gave this upward curve.

One test, for instance, showed 102, 106 and 108 per cent, respectively, after 12, 24 and 48 hours' exposure to the test, and at the end of the hours the curve had dropped to its starting point of 100 per cent and did not fall below this after 144 hours, at which time the test was discontinued, whereas three of the 30 per cent wires after 144 hours had fallen to 56, 58 and 58 per cent, respectively.

We have, of course, tried out this aging test on samples of known life, starting with a knowledge of most of the conditions under which the original compounds were made and vulcanized, and although the conditions may not have been exactly the same, the results should have been more nearly comparable, as in the accelerated test the curve was a decreasing one from the beginning and in the actual life test there was a decided increase from the beginning, and at the end of ten years the value was 150 per cent of the original.

Other compounds on which we have a better check have shown in a year and a half an increase from 1,200 to 1,800 pounds tensile strength and at the end of three years were still 1,800 pounds or above, representing an increase to 150 per cent, whereas in the accelerated tests these have shown a downward curve from the beginning.

I am decidedly of the opinion that this accelerated test is of value to the manufacturer in determining the best time and temperature to be used in vulcanizing compounds of the same general type, and I am also of the opinion that it is of great value to the manufacturer in passing judgment on the relative value of many of the ingredients used in rubber compounding, and while not prepared to state any relative values, I am quite sure that after further experiments we shall be able to arrive at an interpretation of results which will be of value to the consumer as well as to the manufacturer.

Referring to Mr. Tuttle's description of tests after which the tensile strength of the articles had fallen down, Mr. Whipple said:

We had some cable made in 1906 which was furnished to the government, and was stored under water at Fort Wadsworth. There were about ten reels, one mile each, and those ten reels continually went down on the electrical test. Now, after nearly ten years, they are entirely defective electrically. The tensile strength of the insulation is over 1,800 pounds and the elongation over 12 inches after ten years. You cannot find an apparent mechanical defect anywhere; they are simply water-logged. This experience is just the opposite of the one mentioned by Mr. Tuttle, but it also shows that both methods of testing must be considered.

P. L. Wormeley then spoke of the work being done at the Bureau of Standards along the lines of Dr. Geer's investigations:

I have been conducting the test which has just been described for something over four years, and would say that in a general way the diagrams which Dr. Geer has put on the board illustrate very well the results obtained at the Bureau of Standards. Our first tests were made with 12 compounds furnished by Dr. Geer and in some cases sufficient time has not elapsed to show their life under normal aging conditions. The results that we have obtained would indicate that the effect of dry heat at 160 degrees F. on the physical properties of rubber compounds is indicative of the probable life; but these results have not exhibited any definite relation between the effect of the heat test and the effect of aging under normal atmospheric conditions. When our tests

have gone a couple of years longer and we can plot the curves, it is possible that some relation can be shown.

Mr. Wormeley also touched upon the effect of under-vulcanization upon the results of the accelerated heat test:

We have had some experience along this line in testing the 12 compounds already referred to as having been furnished by Dr. Geer. Each of these compounds was represented by three cures, one supposed to be the correct cure, one under-vulcanized and one over-vulcanized. In plotting the effect of heat on tensile strength and on elongation, three distinct curves were usually obtained for each compound, the under-vulcanization being represented by the top curve, the correct vulcanization by the middle curve, and the over-vulcanization by the bottom curve. In the case of the lower grade compounds, particularly those containing shoddy, there was not much difference in the effect produced by the different degrees of vulcanization.

J. B. Tuttle followed, emphasizing the desirability of supplementary chemical tests:

All of those who have so far taken part in this discussion have been using mechanical tests, such as tensile strength and elongation, as a measure of the rate of deterioration during aging. For some four or five years, I have been making some tests on the aging of rubber bands, by determining the amount of organic acetone-soluble matter. These tests are still unfinished, but as far as I have gone, the results are significant. Samples having an initial acetone extract of, say, 7 per cent or more, show a rapid increase by the end of the first year. Those with 5 per cent show very little change for a year or two, but increase rapidly after that time. Samples with 4 per cent or less show practically no increase in four years, and I cannot say just now what will happen to them during the next year. As far as their usefulness is concerned, the 7 per cent bands are worthless at the end of a year, and the 5 per cent bands in about three years.

In considering these facts, it occurred to me that if we could duplicate the conditions in a rapid test, then the chemical tests would provide us with an excellent method for checking up the results obtained by means of the mechanical tests. I have made a few attempts along this line, but I have not yet been able to duplicate the causes I have indicated here. It may be that, given the correct temperature and length of time of heating, we would be able to form a fairly accurate estimate of the probable life of the compound.

I tried exposing samples to direct sunlight, and while the results showed some promise, the time required was six weeks or more, and, of course, is out of the question.

So far as heating is concerned, the tests have not shown the degree of difference in behavior of the 4, 5 and 7 per cent compounds that I would like to see, but I believe that if this problem could be satisfactorily worked out, it would be of great value in checking the results obtained by means of the mechanical tests, and thus be more certain that we are getting a good compound.

An especially illuminating instance was cited to emphasize the mistake of placing too much reliance on any one test. Said Mr. Tuttle:

We tested a shipment of rubber gloves intended for the Panama Canal. Every glove was tested and found to be satisfactory, yet within six months of the time after they had been shipped to the Canal, and placed in storage there, they were found to be in a defective condition. Some of these were returned for examination and further test. These gloves stood about 10,000 volts on the break down test, but if you took one of them and simply bent it once, it cracked all the way across. The tests of strength and elongation are the important ones here. The gloves were all right electrically as long as they were not in use.

I have had similar experience with insulated wire. A few days ago I was testing some wire which had been in service only a few years. The electrical properties were satisfactory enough, but the insulation had hardened so that if the wire was bent, the insulation cracked.

The point which I wish to bring out here is this: In making these accelerated life tests, it is not sufficient to rely on one method of testing only; if we are testing rubber insulation, we must make the mechanical tests as well as the electrical tests, and I am not at all certain that the time may not come when we shall add a chemical aging test as well.

Mr. Postmontier's remarks were directed to the possibilities of an accelerated aging test and included valuable suggestions for definite organization of the work:

I am not in a position to make very many experiments of this kind and I suppose that the rubber manufacturing laboratories have neither the facilities nor the time; but it has struck me that there is a possibility of a great amount of very important and useful work that could be done by this Rubber Section. There is always a difference between the rubber chemist and the consumer as to the proper specification for rubber materials, and it has occurred to more than one rubber chemist that many times the specifications are drawn to a poorer grade of material or a more expensive grade of material than the consumer might use. On fillers and on rubber content which are called for in different materials, we find a defect in many as to the best materials. The consumer is always after the best material possible, but does not always know how to get it. The majority of rubber manufacturers, being honest, are eager to give the consumer the best material they can; and it seems to me that a coördination of rubber chemists in a section like this can do very good work in determining what are the best materials for the rubber compounds for different purposes. We experiment with a very large amount of compounding material and a large number of different kinds of rubber. It would be almost impossible for any rubber laboratory, even the laboratory of a very large manufacturing concern, to do the necessary work in examining the different features involved. There would always be the element of difference as to the method of tests and liability of result.

There should be a committee appointed by the Rubber Section, first of all, to standardize an accelerator test. It is a very good test—probably no better test can be found—but at the same time there are errors that may be introduced: A faster or a slower current of air; questions as to the uniform temperature, and so on; questions on the heating principle might be brought out. Standardized compounds might be suggested and different laboratories that are willing to enter the work designated to determine the effect of two or three more compounds. Gradually the whole field of different compounds and rubbers could be investigated and a great deal of important work accomplished by this kind of coördination.

E. A. Barrier believes that aging tests are not yet sufficiently conclusive to be of great value to the consumer:

I am quite sure that every consumer arranges to get all of the coöperation he can from the manufacturer; but it seems to me that this aging test is apparently not yet in a position where it will be of very much value to the consumer. It is very evident that there is no definite conclusion as to the normal life of rubber in the aging test. What the consumer wants is a test that he can actually see; and if the sample shows up well in a few days he wants to know that it will last two or three years. In the accelerated aging test a sample may show good results in ten days and the ten-day sample may last a shorter time in service than the three-day sample. It is of value to the manufacturer, but of no value to the consumer. Thirty per cent is a very wide classification and also one that does not directly answer the argument—that these accelerating tests show we have had very little information as to the actual service condition. For instance, this new specification which was discussed this morning confines that to a type. Therefore, the consumer of insulated wire under that specification could use this test, due to the fact that a manufacturer is limited in his specific gravity, and for commercial reasons, he has to bid as low as the next man, and if he follows the specifications he will have the same compound, or practically so.

While not a chemist, Mr. Pierce expressed himself as particularly interested in the subject of accelerated tests and hopeful of an ultimate result. Said he:

The consumer is not primarily interested in how strong the wire is or anything else of that sort which you, as chemists, are always working on, but the consumer is interested in knowing whether that wire is going to be electrically insulated after one or ten years. It occurs to me that if the work on this accelerated test is to be continued and elaborated, it might be profitable to learn whether the insulation shows good electrical properties after this accelerated test, because that is the result you are after. This is done now by chemical tests or mechanical tests, and if it were possible to add to such accelerated tests, tests of electrical properties, the insulation arrived at, etc., the results would mean more to the consumer, and he would be able to grasp it more readily. What the consumer is interested in, in the case of wire, is the question of its electrical properties.

Mr. Kimley then raised a point regarding the aging effect of light:

It occurs to me that perhaps the actual life of rubber is influenced by light conditions. If it were standardized under the

same conditions of light as the articles will be subjected to in actual use, it would disclose a result; for instance, the cover on a hose. On the under side of the hose, the tensile there will deteriorate very slowly while the upper side, against the light and against the building, will deteriorate rapidly, and it must be the condition of light which causes this effect. I think this accelerated age test must be a good thing for the consumer.

Dr. Weber reported that he has found a simple method of accelerated aging highly satisfactory, and described it as follows:

I have carried out in the past five or six years a large number of these accelerated aging tests and while my method of procedure is not the highly scientific one which Dr. Geer has outlined, the results obtained have been so satisfactory that I have come to have great faith in the test.

My method of procedure is to subject the sample in question to a temperature of 65 degrees C. for a period of two weeks. A sample of approximately the same composition and of known aging qualities is subjected to the heat treatment together with the unknown sample. At the end of two weeks the two samples in question are compared and from their relative condition very accurate conclusions regarding the aging properties of the unknown sample can be drawn. It is highly important that the sample of known aging properties have a composition similar to the unknown sample, for it is very readily observed that the higher the rubber content the more violent is the action of the heat.

There are other precautions to be observed if misleading interpretations are to be avoided. If the unknown sample is undercured, and at the same time contains considerable free sulphur, I have found that unreliable results are obtained. On the other hand, if the sample in question is at all over-cured, the heat treatment shows this up in a very pronounced manner.

I would rather feel that the contradictory results which have been obtained in the accelerated aging test are largely due to the fact that the action of the heat is materially influenced by the nature of the compound and that the latter must be taken into very careful consideration in the interpretation of the results and general conclusions that are drawn. On the other hand, when this factor is taken into careful consideration, very accurate and reliable predictions can be made.

Later, during a discussion regarding free sulphur in vulcanized products, Dr. Weber stated that personally he could see no objection to it in an article properly vulcanized, and he questioned if it were an accepted fact that free sulphur is bad for rubber.

Mr. Potts, in concluding the discussion, made the following important suggestion:

It occurs to me that if we try to get a test to indicate what kind of service the sample will give, a compound which has very little free sulphur will show very little service and the accelerated test will confirm that service. If there be a large amount of free sulphur, then free sulphur in actual service may not have a great effect on the material; but at 65 or 70 degrees, the accelerated test may indicate a shorter service than we actually get in use.

PRODUCTION OF SOAPSTONE AND TALC.

In the production of soapstone the United States ranks first among all countries, and Virginia produces about twenty times as much as the four other producing States—Maryland, North Carolina, Rhode Island and Vermont.

The production of soapstone and talc in the United States is steadily increasing, according to the United States Geological Survey, Department of the Interior. In 1900 it was 27,913 short tons, in 1910 it was 150,716 tons, and in 1915 it was 186,891 short tons.

DUSTLESS LAMPBLACK.

The disagreeable features that invariably attend the use of lampblack or carbon black are plainly evident in the compounding room and around the mixing mills. Pressed lampblack has been used for a long time, but even that is in a more or less powdery condition and only furnishes a partial relief from the flying dust. Carbon black, now used extensively by tire manufacturers, is of a more powdery consistency than lampblack and therefore is subjected to greater pressure, a remedy that is only a partial cure.

Dustless lamplack may be made by mixing 60 per cent of lampblack with 40 per cent of petroleum or palm oil. The resultant compound is a substance that has the consistency of lard or soft butter and may be compounded and milled with perfect cleanliness. The name "Petroblack" is obviously fitting for the former and "Palmoblack" for the latter.

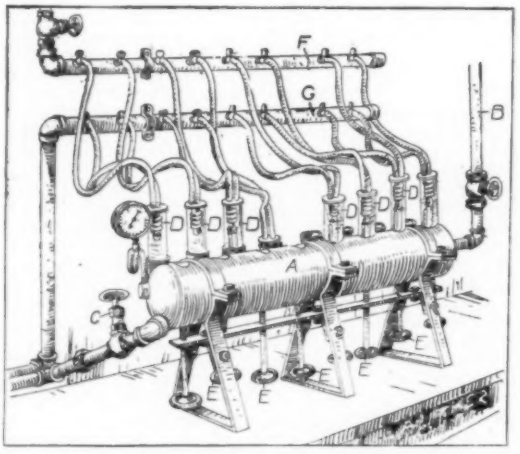
HEATING APPARATUS FOR EXTRACTORS.

D. REPONY, assistant chemist in an important American rubber factory, is the inventor of the interesting apparatus described below.

As a preliminary, it is not necessary to dwell upon troubles attending extraction apparatus heated with open steam. Moreover, while electric plates are clean they are not ideal, as they get out of order easily, the danger of fire is always present and the cost of operating is quite high.

It is claimed that the apparatus illustrated here has taken care of all the objections present in the other types, is simple and cheap to operate and when once installed will last a long time.

It is heated by steam under such conditions that not a trace can escape from the heating casting. This heater is a hollow



A—Heater. *B*—Steam Inlet. *C*—Steam Exhaust. *D*—Extraction Containers. *E*—Adjusting Screws. *F*—Water Supply Pipe. *G*—Waste Pipe.

one-piece brass casting supported by three standards and adapted to be placed on a bench or table. The eight holes to accommodate as many extractors are cored out of the casting at the top, with jackets to prevent direct steam contact. Eight hand screws, supported underneath the heater, are used to raise or lower the extraction containers in the jacketed holes, so that solvents of different boiling points may be run in adjacent containers and the quantitative amount of solvent in circulation regulated. The heater is sufficiently strong so that steam under pressure may be used when it is necessary to use solvents with a high boiling point; however, with solvents up to and including alcohol, the free circulation is sufficient. Steam is admitted at the right end and exhausted through a pipe at the left end of the heater where a steam gage is located to record the pressure.

The extraction containers are common 1½-inch test tubes which fit snugly into the jacketed holes. The condensers are of block tin and the tubes closed by covers of the same metal. Rubber tubing connects the condensers with the water supply and waste pipe, and galvanized cups attached to the frame back of the brass heater afford convenient receptacles in which to place the containers after removal from the heater. This has been found very convenient when extractions are run for a definite time and especially when the removal is left to the night watchman.

What the Rubber Chemists Are Doing.

SYNTHETIC CAOUTCHOUC.

THE researches on the chemical constitution of caoutchouc and the sources and processes available for its synthesis, have been outlined by B. D. W. Luff in the "Journal of the Society of Chemical Industry" (October 16, 1916). The author's paper may be summarized as follows:

Between 1835 and 1840 the study of caoutchouc was undertaken on scientific lines by various investigators, including Dalton, Liebig, Himly, A. Bouchardat, and Gregory, but in all cases their work was more or less disjointed. The most systematic attempt to isolate and examine the various products present in the crude distillate from caoutchouc was made by Greville Williams in 1860. He obtained (1) a liquid boiling at 37 degrees C. to which he gave the name "Isoprene"; (2) a large proportion of a hydrocarbon boiling at 170 to 173 degrees C. which was identical with a body previously obtained by Himly, and called caoutchoucine—this has since been proved to be dipentene; (3) a fraction boiling above 300 degrees C. to which he gave the name "Heveene."

Gustave Bouchardat in 1879 undertook a detailed investigation of isoprene, in the course of which he examined the action of hydrochloric acid; he noted that an additional product was formed, but under certain conditions the action of the acid resulted in the formation of a solid mass, not containing chlorine, but having, in fact, the same percentage composition as isoprene itself. He described this body thus: "It possesses the elasticity and other properties of rubber itself. It is insoluble in alcohol, swells in ether and also in carbon bisulphide, in which it dissolves after the fashion of natural rubber." He also noted that on distillation it yielded the same hydrocarbons as in the case of the natural product. This was an important step in the synthesis of caoutchouc; in fact, in order to make this complete, all that was necessary was to prepare isoprene from elementary materials. At that time the only source of isoprene was rubber itself.

Bouchardat's results were confirmed in 1882 by Tilden who observed the polymerization of isoprene. In discussing isoprene he remarked that one of its chief characteristics was its conversion into true caoutchouc when brought in contact with certain chemical reagents. He pointed out that this was of great practical interest as, if isoprene could be obtained from some other and more accessible source, the synthetical production of rubber could be accomplished. Two years later he succeeded in obtaining isoprene by passing the vapors of turpentine through a hot tube.

The outcome of the work of these two investigators was that the caoutchouc molecule was shown to be formed by the union of a number of molecules of isoprene, and this union or polymerization could be brought about by treating the isoprene with suitable reagents. To them must be given the major share of the credit for laying the foundation of the numerous processes since suggested for preparing synthetic rubber.

In 1887 Wallach observed that isoprene undergoes polymerization on exposure to light with production of a rubber-like mass. In 1892 Tilden showed that the material obtained in this manner could be vulcanized with sulphur. The synthesis of isoprene, and as a corollary, that of caoutchouc, was accomplished by Euler in 1897.

In 1909, owing to the rapid rise in the price of rubber, the problem was taken up in England in a systematic manner by Perkin, Fernbach, Weizmann and Mathews and in Germany by the Bayer and Badische companies. In 1884 Tilden suggested that not only isoprene, but its homologues should be capable of polymerization in a similar manner. This was found to be the case, and these bodies, chief among them butadiene, form the basis of methods for obtaining synthetic caoutchoucs.

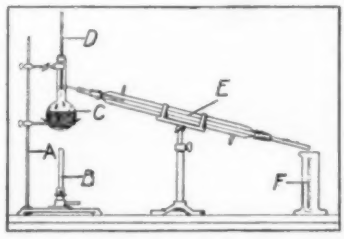
Among the materials available as starting points for suggested syntheses are coal tar; the low-boiling fractions obtained in petroleum distillation; starch and cellulose. On account of the colloidal nature of caoutchouc the question whether or not the synthetic caoutchouc-like bodies can be regarded as true caoutchouc cannot be settled by determining such physical characteristics as would serve to identify a crystalline solid such as camphor.

Harries holds the view that caoutchouc obtained from isoprene with the aid of acetic acid is identical with that occurring in nature. This view is dissented from by Stemmig. The synthetic caoutchouc obtained by polymerization of isoprene in the presence of sodium, however, is not identical with the natural product. In view of the rapid advance in the cultivation of rubber it is generally assumed that unless a synthetic product can be marketed at about 30 cents per pound there is little hope of the natural material being superseded.

METHODS OF ANALYSIS.

TESTING ANILINE OIL.

PURE aniline boils at 360.5 degrees F. and at this temperature 95 per cent of the sample should distil. A common method of testing it is with the apparatus shown in the illustration. It consists of a ring stand *A* and a piece of wire gauze to support the flask; a Bunsen burner *B;* several 200 cc. Lunge distillation flasks *C;* a thermometer *D;* a funnel for filling the flask; an 18 or 20-inch condenser *E,* and a 100 cc. measuring cylinder *F.*



To make the test, 100-cc. of aniline oil are put into the flask by means of the funnel; the apparatus is assembled as in the illustration, and a flow of water connected from the tap to the condenser. The contents of the flask are gently heated until 360.5 degrees F. is reached, at which temperature it is maintained. The volume of oil collected in the cylinder is the measure of the purity of the aniline.

CHEMICAL PATENTS.

THE UNITED STATES.

VULCANIZING PROCESS. Treating rubber for vulcanization by adding vulcanizing material containing lead and sulphur and a reactive substance comprising a metal and an acid radical adapted to form, with the sulphur and lead, respectively, a light-colored water-insoluble sulphide and a light-colored water-insoluble lead salt and vulcanizing the mixture. [Harold R. Murdock, Naugatuck, Connecticut, assignor to Rubber Regenerating Co., a corporation of Indiana. United States patent No. 95,359 (May 4, 1916).]

PURIFYING ISOPRENE. Isoprene is treated with sulphurous acid in presence of hydrochloric acid which serves to facilitate the formation of a crystallizable sulfoxide for the recovery by heat of the pure hydrocarbon. [F. E. Matthews and E. H. Strange. United States patent No. 1,196,256.]

RUBBER COMPOUND. Rubber, dry cork flour, iron slag and gelatinous rawhide, the quantity of rubber in the compound being less than the combined weights of the other ingredients. [Eugene Von Vargyas, Washington, D. C. United States patent No. 1,202,340.]

AGENT FOR TREATING VULCANIZED RUBBER. As a new agent for the treatment of vulcanized rubber, the solution of vulcanized

gum in a solution of resin in a hydrocarbon. [Harry B. Cox, Bedford Hills, N. Y. Assignor to Herman Goldman, New York, N. Y. United States patent No. 1,202,758.]

RUBBER PRODUCT. A product comprising recovered stock replenished with resin, and a material obtained by dissolving vulcanized gum in rubber resin. [Harry B. Cox, Bedford Hills, N. Y. United States patent No. 1,202,759.]

PROCESS OF RECLAIMING RUBBER. A process of recovering rubber stock from vulcanized rubber which consists in treating it with a resin solution together with a solution of vulcanized gum in a resin solution. [Harry B. Cox, Bedford Hills, N. Y. United States patent No. 1,202,760.]

TREATMENT OF FABRICS USED IN CONJUNCTION WITH VULCANIZED RUBBER. According to this process fabric is treated, previous to its incorporation with rubber, with certain reactive materials, in order to protect it against the disintegrating action of sulphurous and sulphuric acids resulting from vulcanization. The materials mentioned as suitable neutralizers include (1) alkalis, such as sodium carbonate; (2) alkaline or basic salts, such as borax or basic lead carbonate; (3) basic oxides or hydroxides, such as lime, baryta, or barium hydroxide; (4) salts of metallic oxides, such as barium carbonate and zinc acetate. [William Edgar Muntz, London, England, United States patent No. 1,203,241.]

SHOE BOTTOM FILLER. Mixture of rosin, Pontianak, and oil solvent thickened with dextrin to a stiff shoe-bottom filler when cold. [Andrew Thoma, Cambridge, Massachusetts, assignor to North American Chemical Co., New York City. United States patent No. 1,203,435.]

SIZING COMPOSITION. Consisting of rosin soap in which is dissolved approximately one per cent. of rubber material. [Judson A. De Cew, Montreal, Canada. United States patent No. 1,203,857.]

TIRE FILLER. A mixture of paste, plaster of paris, chalk, a perfume, alcohol and bismuth subnitrate. [David G. Elder, Chickamauga, Georgia. United States patent No. 1,203,720.]

VULCANIZATION PROCESS. Consisting in mixing wood creosote, partially vulcanized vegetable oils and rubber compound, and subjecting the whole to a vulcanizing heat. [Augustus O. Bourn, Bristol, Rhode Island. United States patent No. 1,203,966.]

NON-INFLAMMABLE WATERPROOFING COMPOSITION. Consisting of a mixture of rubber cement, spirits of turpentine, paraffin wax, gasolene and tetrachloride of carbon, the physical characteristics of which are that it is non-inflammable and waterproof. [James O. Persons, Norfolk, Virginia. United States patent No. 1,204,056.]

CANADA.

RUBBER PRESERVATIVE. Comprising in combination, cocoa butter, castor oil and gasolene in the proportions of two ounces to two quarts, to one quart, respectively, of the ingredients named. [Samuel T. Smith, Blue Island, Illinois, U. S. A. Canadian patent No. 171,630.]

THE UNITED KINGDOM.

VULCANIZATION BY ULTRA-VIOLET RAYS. [H. P. M. A. Oliver. British patent No. 7,823 (1915).]

SUBSTITUTE FOR RUBBER. Mixture of colophony, caoutchouc, sulphur, naphtha and white lead. [R. Castels. British patent No. 7,703 (1915).]

SWITZERLAND.

REGENERATING RUBBER. Fabric containing rubber is treated with tetrachloroethane, with heating, as a solvent for the rubber. [Compagnie Générale des Caoutchoucs de Térébenthine. Swiss patent No. 72,731 (June 16, 1916).]

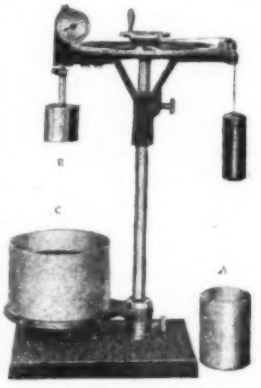
SWEDEN.

RUBBER SUBSTITUTE. Rubber and egg albumen is molded and cold vulcanized, or after addition of sulphur it is hot vulcanized. [C. Lamberty. Swedish patent No. 40,822 (June 14, 1916).]

LABORATORY APPARATUS.

STORMER VISCOSIMETER.

THE Stormer viscosimeter permits accurate practical work with a small sample of liquid. It is simple in construction; may be quickly and easily cleaned and permits a greater number of tests to be made accurately within a given time than other instruments designed for this purpose. A 50-cc. sample is all that is required for a test.



The instrument is designed upon the principle of rotating a cylinder in the liquid under examination by means of a constant weight and at a known temperature. It consists of a cylinder *B* which may be rotated in a test cup *A*, surrounded by a water or oil bath *C* to maintain the desired temperature. A revolution counter is connected to the spindle supporting the cylinder. The time required for the cylinder to make a specified number of revolutions in distilled water and in the liquid under examination is the measure of the viscosity sought. [Bausch & Lomb Optical Co., Rochester, New York.]

BARNSTEAD AUTOMATIC WATER STILL.

The value of pure distilled water for laboratory and manufacturing operations is universally recognized. The type of automatic still here illustrated and described is heated by gas, steam or electricity and will produce, it is claimed, pure water free of ammonia and all gaseous and organic impurities at a low operating cost. The operation of the still is continuous. The water enters the condenser at the supply pipe and, passing around the condensing tubes, is discharged into an open pipe, allowing the

gases to escape. The water thus purified passes into the still where it is converted into steam, and passing into the condenser is condensed and discharged chemically pure. A continuous stream of water is required for cooling purposes and to supply the boiler that in this particular still is heated by gas. [Eimer & Amend, New York City.]

Guayule Cultivation in the United States.

A RUBBER PREPAREDNESS SUGGESTION.

THERE is a real prospect that the United States may yet become an important rubber producing country. The humid tropical climate essential to the growth of laticiferous rubber bearing trees is lacking, but the silver colored guayule shrub (*Parthenium argentatum*), a member of the aster family, grows wild in many sections of the American Southwest as it does over the central plateau of Mexico. What American enterprise did previous to 1910 in Mexican guayule fields is well known. But the long continued series of revolutions in Mexico reduced the average yearly export of 10,000 tons of guayule rubber to 720 tons in 1914, 2,555 tons in 1915 and 1,408 tons during the 12 months ending June, 1916.

It is not surprising that in 1911 there were 6,000,000 acres of guayule growing wild in Texas alone, because these guayule lands belong to the same belt of which the Chihuahuan desert is a part. This great possibility remained neglected for the most part as long as Mexican export continued, because of the high cost of American labor, but with the supply interrupted and conditions in our sister republic showing scant signs of early improvement, state officials and rubber men turned their attention to it. Experiments in several localities indicated that guayule, in the United States, as in Mexico, responds readily to cultivation, yielding increased growth and greater storage of rubber in its tissues. Not only does it secrete rubber of excellent quality in both root and stem, but its culture involves fewer difficulties than any other commercially important rubber plant, and it thrives best on lean soils in a dry climate. These facts render it so good an investment of the capital needed that the first Arizona plantation of 9,200 acres, to cultivate it on a commercial scale, promises to be the forerunner of many others soon to follow.

THREE YEAR TWO YEAR ONE YEAR

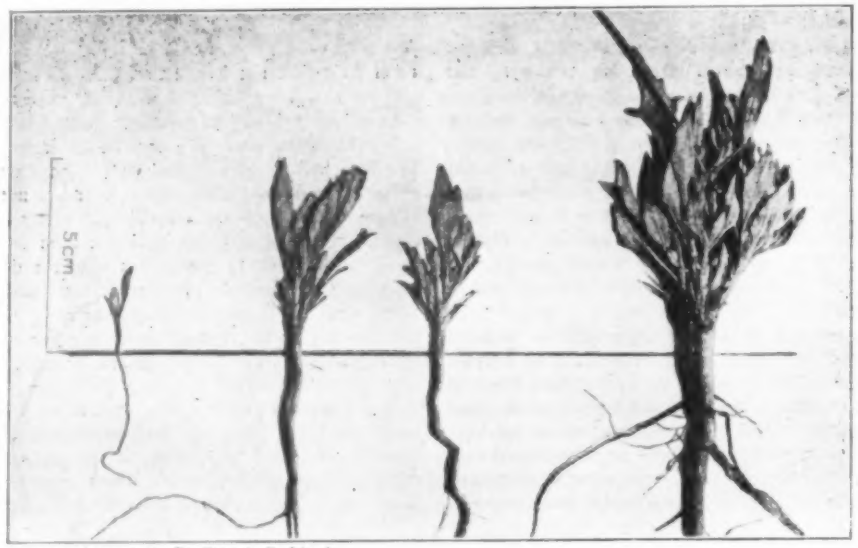
GROWTH OF GUAYULE ON GROUND CUT-OVER.

Here, indeed, lies an unparalleled opportunity to turn our vast acreage of arid waste lands to profitable use. What this means to the nation is not difficult to compute. The western arid region comprises about two-fifths of the United States; that is to say, approximately 1,200,000 square miles or 768,000,000 acres. Of this, not less than 500,000,000 acres have a position, altitude and precipitation that would render irrigation very advantageous, yet under the most favorable circumstances only about 45,000,000 acres are capable of irrigation, of which 31,544,000 acres had already had water placed upon them in 1900.

But what of the other 455,000,000 acres not capable of irrigation? These lands are very rich in mineral plant foods. The potassium and phosphorus have not been dissolved and washed away, and they have continuous sunshine during the day. On such lands the guayule often grows wild and may also be cultivated, although it does not mature as rapidly as under irrigation. In this respect its characteristics are peculiar. Although preferring a dry climate and porous, sandy soils, it endures considerable rain. Stimulated by heavy precipitation or regular irrigation it attains a rapid, sturdy growth with large root development, the latter being particularly important because the greater quantity of rubber is secreted in the roots. Thus, the heavier the growth the greater the crop, but, curiously enough, conditions favorable to rapid, heavy growth are unfavorable to a large secretion of rubber. The ideal routine consists of irrigation for rapid growth to adequate size, followed by six or eight months of drought to promote secretion of rubber in the tissues, the whole covering a period of four years. Irrigation projects for general crops have the objection that the alkalies, such as sodium carbonate, sulphate and chloride, are often abundant in the sub-soil of these western lands, and when placed under irrigation are brought to the surface in solution by capillarity. When the accumulation of evaporated alkalies reaches a certain amount, many crops will no longer thrive, but guayule will. Already considerable areas have been abandoned in this manner in every state where irrigation has been practiced. Thus the claim of Courtenay De Kalb that in California guayule under irrigation has been known to produce as much as 28 per cent of its net dry weight

in rubber, if his figures can be substantiated, is of great interest. The conservative estimate, by the way, is 8 to 10 per cent.

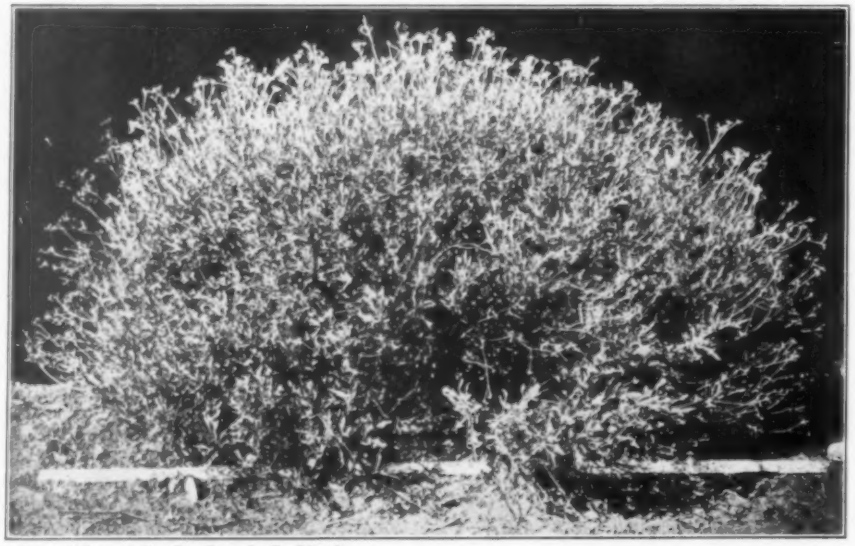
De Kalb further states that by four-year intensive irrigation methods, 25 tons of dry plant may be grown per acre. On the basis of 8 per cent rubber this would yield 4,000 pounds, worth $1,520, according to the present low market price of 38 cents per pound. American experience places the average cost of culture, harvesting, extraction and marketing at $200 an acre annually, or $800 for the crop. This makes the net income $720 an acre or $180 an acre per year. Few crops surpass this on an average of four consecutive years, and what can be grown on arid soil which will approach so high a return? Assuming that 5,000,000 acres of irrigable land, still unutilized, could be devoted to this purpose, the yield would be 10,000,000 tons for the four years, equivalent to 2,500,000 tons annually and worth $8,500,000,000.



From "Guayule." By Francis E. Lloyd.

AVERAGE MINIMUM AND MAXIMUM SEEDLINGS

Once more, what of the 455,000,000 acres of arid agricultural land not capable of irrigation? If planted with guayule and properly conserved according to the principles of modern forestry, they would create a great new American industry that would be a source of wealth in time of peace and a protection in case of war. Fifteen years is considered the proper rotation period, as in that time the maximum economic efficiency of the plant is reached at a height of about 16 inches, when it should be removed, not only for the better growth of younger plants, but for the greater efficiency of seeding. Thus cuttings should be made close to the ground every fifth year. The old practice of pulling plants up by the roots is to be discouraged as it gives no opportunity for new shoots to be sent up during the next growing season.



From "Guayule." By Francis E. Lloyd.

IRRIGATED PLANT, TWO YEARS OLD, FROM A STOCK.

Assuming 11,200 plants to the acre and each dry plant averaging 1 pound at 15 years, the yield would be 5 tons of shrub per acre, or 896 pounds of rubber on an 8 per cent basis. Were 455,000,000 acres so planted the yield would be 182,000,000 tons every five years, or an average of 36,400,000 tons annually, worth $154,700,000,000 at the current price of 38 cents per pound. Thus, the United States is potentially able to provide within its own borders many times its own requirements of crude rubber.

Reviewing the history of guayule extraction the following points are of interest: The natural habitat of the shrub embraces the northern portion of the great central plateau of Mexico, known as the Chihuahuan desert, and a portion of southwestern Texas, an area of nearly 130,000 square miles, of which about 34,000 square miles actually bear guayule. From this source it has been estimated by Endlich that 225,000 tons of shrub had been disposed of up to 1909, which was about half the total supply originally available. The altitude of this region varies from 2,000 to 10,000 feet above sea level, the average being 6,000 feet, for guayule can withstand very low temperatures as well as summer heat. The records include 5 degrees F. at Marathon, Texas, and 10 degrees F. at Tucson, Arizona. Very little rainfall is necessary, the average throughout this region being around 10 inches annually, although the growth of the plant is in proportion to the precipitation. The plant grows during the rainy season and creates rubber during the dry months, the residual soil moisture, except in rare instances, being sufficient to sustain life. Maximum growth occurs early in the warm season, when superficial soil water is most plentiful and night and day temperatures are more nearly uniform. The humidity of the region is relatively high, with a somewhat prolonged summer period of high humidity. Dew is frequent during

the cooler months, the dew-point always being approached closely at night and frequently passed in winter and during the rainy summer season.

Rarely is wild guayule found growing in the alluvial plains of the Mexican plateau. It prefers gravelly, calcareous soil fit for little else, and so, because of its hardiness and easy cultivation, lends itself readily to the agricultural development of our arid Southwest. Propagation is from the seed, and artificial fertilization of the flower is essential in order to insure reliable results. As this requires skill, the plants are started in nurseries under the care of trained horticulturists. When the stalks attain a diameter of one-fourth inch they are transplanted to the field in rows three feet apart, the plants standing 18 inches apart in the row. Although each capitulum produces only a maximum of five seeds, a plant of moderate size will yield many thousands, but the percentage of viable seed does not usually exceed 5 to 25 per cent.

To go into the details of the cultural operations of procuring seed, raising seedlings, transplanting them, caring for the growing plants and harvesting the cultivated guayule would trespass beyond the scope of the present article. These details may be found by those interested in a work on the subject by Professor Francis Ernest Lloyd and published by the Carnegie Institution of Washington. It should be apparent from the foregoing, however, that the possibilities of guayule in the United States are almost unlimited; that its growth might easily become one of our greatest agricultural industries, and that it may thrive in the barren lands of the South as well as in the arid wastes of the Southwest.

REFERENCES.

Important articles devoted to this subject that have appeared in previous issues of THE INDIA RUBBER WORLD include: "The Guayule Rubber Situation," Francis E. Lloyd, Vol. 41, page 115; "The Future of Guayule," Vol. 45, page 20; "The Propagation of Guayule," Francis E. Lloyd, Vol. 45, page 164; "A Guayule Resumé," Harold von der Linde, Vol 45, page 166; "Notes on the Acclimatization and Cultivation of the Guayule," Francis E. Lloyd, Vol. 47, page 183, and Vol. 48, page 563; "A Journey Through Guayule Land," Henry C. Pearson, Vol. 35, pages 173 and 205.

TIRE REPAIR VULCANIZERS AND ACCESSORIES IN SOUTH AMERICA.

According to our contemporary "The Automobile," American tire vulcanizers are not adequately represented in South America, where there is a good market for such devices.

In Argentina alone there are 30,000 automobiles, every one of which has tire troubles. Moreover, South American automobilists are not as a rule careful of their tires, and hence the need of frequent repairing. There is a good market for small vulcanizers, such as chauffeurs can use, as well as shop vulcanizers for garages. In Cordoba, Argentina, there is a garage with an up-to-date vulcanizing department, its entire equipment having come from the United States.

Non-skid chains are good sellers in every section of South America, in many cases being included as part of the standard equipment of an automobile. Oversize tires are also in demand and generally on sale. Slip covers, made of rubberized fabric, for automobile seats, are popular and sell well in all South American countries.

JAPANESE LABOR FOR BRAZIL.

That arrangements have been concluded to send 20,000 Japanese to Brazil within two years is the report of the American Vice-Consul at Yokohama, Japan. The negotiations with the Brazilian Government were conducted by a representative of a combine of Japanese emigration companies. A group of 5,000 men will be sent twice a year, in the spring and autumn, and the Brazilian Government will contribute £8 [$39] toward the transportation expenses of each emigrant.

GUAYAQUIL RUBBER MARKET IN SEPTEMBER.

The rubber market in Guayaquil, Ecuador, was quiet during September, the quotations of $23.30 for *maromas* (ropes) and $19.07 for *hojas* (sheets) being the same as for August. Shipments amounted to 15,077 pounds, all going to the United States.

RUBBER TRADE OF COLOMBIA.

The rubber producing industry in Colombia is still in its infancy, but it is growing rapidly, and the producton for the year 1915 showed 100 per cent increase over that of the preceding year.

The chief purchasers of Colombian rubber are the United States and Great Britain. Prior to the war Germany was also becoming an important buyer. In 1915 the exports of crude rubber from Colombia to the United States amounted to $89,348, against $41,849 the previous year; those to the United Kingdom amounted to $5,018 in 1914, but fell to only $2,605 in 1915.

Most of the crude rubber exported from Colombia is obtained from wild *Castilloa* trees, but in the Atrato valley, and also in some other districts, there are rubber trees under cultivation.

RUBBER TRADE IN PANAMA.

The American Consul-General at Panama City, Panama, reports that the exports of crude rubber from his consular district during the year 1915 amounted to 70,604 pounds in quantity and $18,874 in value, against 142,444 pounds valued at $10,561 exported during the previous year.

According to the annual report by the American Consul at Colon, Panama, the exports of crude rubber and balata from his district amounted to $128,794 in 1915, against $65,859 the previous year.

RUBBER IMPORTS AT HANKOW, CHINA.

The American Consul-General at Hankow, China, reports that imports of rubber and rubber goods through that port in 1915 amounted to $19,263, compared with $7,918 during the previous year, showing an increase of $11,345.

RUBBER TRADE OF SIAM.

The United States Vice-Consul at Bangkok, Siam, reports that imports of American rubber goods into that country during the fiscal year 1915-1916 amounted to $2,011, against $378 during the previous fiscal year.

The total exports of crude rubber from Siam during 1915-1916 amounted to $11,055, against $15,533 exported during 1914-1915.

RUBBER EXPORTS FROM ZANZIBAR.

Most of the crude rubber exported from Zanzibar is derived from the rubber vine, *Landolphia kirkii*, of which a considerable quantity grows wild in the forests of the Pemba district. Exports for the year 1915 amounted to only 2,384 pounds.

The cultivation of Ceara rubber, which was taken up by the government in 1907, was not successful and has been discontinued.

CRUDE RUBBER EXPORTS FROM CEYLON.

From the "Report of the Ceylon Chamber of Commerce for the Half-Year ended June 30, 1916," just received, it appears that shipments of crude rubber to Great Britain during the period covered showed a decrease of about 3,000,000 pounds, while those to the United States showed an increase of about 7,000,000 pounds compared with the corresponding period of 1915. In fact, the shipments to America were more than double the 1915 January to June totals and amounted to well over 14,000,000 pounds.

RUBBER FOOTWEAR IN LIBYA.

The American consul at Tripoli, Italian North Africa, reports that during the year 1915, $1,000 worth of American rubber shoes were imported into that colony, against $850 imported the previous year.

Plantation Rubber in Cochin China—III.

By Lawrence P. Briggs, United States Consul at Saigon, French Indo-China.

QUALITY OF COCHIN CHINA PLANTATION RUBBER.

VARIOUS tests show that Cochin China plantation rubber compares favorably with the similar product of other rubber producing countries. The latex produces the usual percentage of rubber and the purity of the manufactured product is not inferior to that of other rubber.

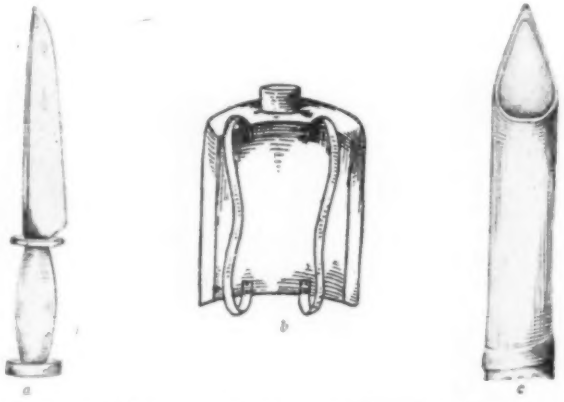
The comparison of the analysis of the latex of the Soui-giao plantation, made by M. Vernet in the Pasteur Institute at Nhatrang, with tests of Brazil and Ceylon rubber shows that the latex of Cochin China contains a greater proportion of rubber than that of Brazil and slightly less than that of Ceylon:

Constituents.	Soui-giao.	Ceylon.	Brazil.
Rubber	37.91	41.29	31.70
Water	54.38	55.15	56.37
Albuminoids	2.30	2.18	1.90
Residue	3.35	.41	0
Sugar	1.43	.36	0
Resin	.62	0	0
Acids	.01	0	0
Organic substances	0	0	7.13
Other products	0	0	2.90

The following table shows the results of analyses made at the Michelin factory of the various classes of Suoi-giao rubber, compared with fine Para rubber of the Upper Amazon:

	Para.	Smoked.	Natural Coagulation.	Coagulation with Acetic Acid.	Scraps.
Rubber	96.87	94.60	97.02	95.87	94.34
Resins	2.62	4.00	2.44	3.59	1.90
Moisture	.32	.68	.15	.18	1.66
Residue	.19	.62	.39	.36	2.10

These tables show the physical composition of Cochin China latex and rubber. The actual physical tests of the quality of Ong-Yem rubber sent to the International Rubber Exposition at London in 1911 gave this rubber a rating of 89.5 points out of a possible 100. Tests were also made to determine its tensile strength (*i. e.*, the weight necessary to break a piece of rubber ¼ by ½ by 2 inches), its extension (*i. e.*, the length of the above piece at the moment of breaking), its strain or coefficient of resistance (*i. e.*, the extension produced by half the weight necessary to break it) and its force of tension, or stress (*i. e.*, its coefficient of rupture per square inch). These tests show the following comparison between the Ong-Yem product and fine hard Para rubber.



NATIVE DEVICES FOR TAPPING AND COLLECTING LATEX.

a—Tapping knife (coupe-coupe). *b*—Knapsack can for collecting latex. *c*—Cup from joint of bamboo for receiving latex.

	Tensile Strength.	Extension.	Strain.	Stress.
Para	59.4 pounds	9¼ in.	4⅞ in.	440 pounds
Ong-Yem	55 pounds	8½ in.	4 1/16 in.	475.2 pounds

Cochin China rubber received honorable mention at the Singapore Exposition (1910), a diploma of honor at the London Exposition (1911), a Grand Prize at the Ghent Exposition (1913) and a diploma of honor, two silver medal diplomas, two silver medals and a gold medal at the London Exposition (1914). It is only necessary to add that it receives the highest prices in the rubber market of Paris.

INSTALLATION: COST OF PRODUCTION.

The installation used in the preparation of the rubber varies from a shed containing a set of rollers and some drying space to a fine, large building and the latest modern equipment such as are found on the plantations of Xatrach and Suzannah. The smaller plantations prepare the product with no equipment except a single roller, while the natives roll it into a mass like wild rubber; but the larger plantations are equipped to make the best quality of smoked sheets of crêpe. The Belland estates, which until 1913 produced nearly all the rubber exported from Saigon, now make only crêpe and scrap rubber, while Xatrach plantation, which during the past two years has been the most productive, turns out various grades of rubber in the following proportions: ⅔ smoked sheets, ⅓ crêpe, Nos. 1, 2, 3 and 4.

Cost of production has, up to the present time, been such a variable quantity that it is very difficult to say anything about it. Only one plantation or group of plantations—the Belland Estates—has approached its limit of production. The Xatrach plantation is the most productive at present, but its trees are young and some experts are of the opinion that the installation and initial expense was too great for the size of the estate. It is estimated that, when the larger plantations are fully developed, the cost of production will be about 50 cents (United States currency) per kilo—a figure somewhat below that of the neighboring countries of the Far East. None of the plantations have ever been able to produce at this figure, except, perhaps, the Belland Estates, which have practically no installation except crêpe rollers.

THE LABOR PROBLEM.

One of the chief factors of cost of production is labor. The laborers on the rubber plantations of Cochin China are nearly all Annamites or Mois. The cost of coolie hand-labor is about 15 to 20 cents (United States currency) per day for men, and 10 to 15 cents for women, with or without rice. The Annamite is industrious, apt and fairly efficient, but slow. The Mois—a semi-savage tribe—are inferior to the Annamites. The Locninh plantation has imported about 600 Javanese coolies. Their slight superiority to the Annamite may be due entirely to their previous training in this kind of work.

The region directly tributary to the port of Saigon—Cochin China, Cambodia and southern Annam—is not overpopulated. This region comprises more than 100,000 square miles and has a population not much above 5,000,000. It is a very rich country. The exports from the port of Saigon generally amount to about $40,000,000 per year—more than 70 per cent of the entire export of French Indo-China, although this region has less than one-third of the total population. This exportation is almost entirely of agricultural products—mainly rice, Saigon generally ranking second to Rangoon among the ports of the world in the exportation of this product. During rice-harvest the labor question is sometimes an anxious one, and this will be increasingly true as

Kilogram = 2.2 pounds. Hectare = 2.47 acres. Franc = 23.8 cents. Piastre = about 50 cents.

the agricultural resources of the country develop. Rice-harvest, fortunately, comes during the dry season when there is least demand for labor on the rubber plantations. Various attempts have been made to transplant coolie labor from the overpopulated districts of Tonkin, where the laborer is more skilful and more industrious and receives smaller wages. This may prove to be the future solution of this problem if it should ever become a serious one. There are many Chinese coolies in Saigon and Cholon, although none has yet been employed on the rubber plantations. Chinese labor is generally slightly more expensive but considerably more efficient than Annamite labor, and there would be no difficulty in inducing Chinese coolies to come in sufficient numbers to supply any demand of the labor market; but Chinese laborers are more independent, and it is quite likely that the French government would object to any considerable influx of Chinese coolie laborers into Cochin China.

The question of health-condition is not a serious one among the coolies of Cochin China. There is always some cholera and often bubonic and pneumonic plague among the natives, and it is thought that the red soil of the rubber plantation is conducive to a peculiar native disease, which the French call *"fievre du bois"* (fever of the woods); but there has never been a serious epidemic of any kind on any of the rubber plantations. Famines are unknown in Cochin China. Since the beginning of the rubber industry here, the annual exportation of rice from the port of Saigon has never fallen below 600,000 tons. Almost every year Cochin China is called upon to relieve the sufferings caused by drought or flood in Tonkin.

TRANSPORTATION.

After the rubber is prepared, there remains the question of its transportation to Saigon. Some of the older plantations; *e. g.*, the Belland Estates, are within sight of the city; but the newer plantations in the red soil district are more distant. The plantations of Suzannah, Xuan-loc and several others in the province of Bienhoa are located 45 or 50 miles from Saigon, out near the railway running to Nhatrang, while the Xatrach Locninh and other important plantations of the province of Thudaumot are 65 to 75 miles from Saigon by automobile. However, the roads are level and good and the high value of rubber combined with its small bulk makes transportation a question of relatively small importance. The construction of railways and automobile roads through the rubber district offers no serious difficulties, and the development of transportation facilities is sure to keep pace with the settlement of the country. Then, too, Cochin China has a wonderful system of water transportation. None of the rubber plantations are very distant from a stream or canal by which rubber can be cheaply transported by *sampan* to Saigon.

Saigon is the most important French seaport outside of France and is accessible to vessels of any draught. It has regular freight connections with the mother-country as well as with Singapore and Hongkong and frequent service to Manila, Bangkok and other neighboring ports.

PRODUCTION AND EXPORTATION.

The production of rubber in the Saigon district, since its beginning in 1908, has been about as follows in kilograms per plantation:

	1908.	1909.	1910.	1911.
Belland estates...*kilos*	1,500	3,000	5,000	10,000
Suoi-giao	1,749	2,573	2,086	3,080
Xatrach	...	...	...	120
Suzannah	...	...	...	...
Others	200	200	300	300
Totals	3,449	5,773	7,386	13,500
	1912.	1913.	1914.	1915.
Belland estates...*kilos*	12,000	18,000	26,000	28,000
Suoi-giao	3,800	3,527	5,319	14,783
Xatrach	1,870	25,170	77,000	128,616
Suzannah	4,480	24,129	47,242	95,776
Others	2,000	14,174	29,439	79,995
Totals	24,150	85,000	185,000	347,170

The exportation of rubber from the port of Saigon during the same period, by weight and value, has been as follows:

	Kilograms.	United States Currency.		Kilograms.	United States Currency.
1908	3,021	$3,797	1912	23,563	$22,201
1909	5,729	4,976	1913	85,000	73,823
1910	6,379	5,540	1914	175,067	152,046
1911	13,577	11,792	1915	357,003	310,057

These figures represent the customs values, which since 1908 amount to 450 francs (nearly $90 United States currency) per 100 kilos. At present this is much below the market value. The actual selling price during the year 1915 began with 620 francs January 1, reached 767 francs early in July, which was high-water mark until late in October, when it rose to 1,073, fell again to 911 during the latter part of November and finished the year at 1,223. Taking 850 francs as an average price for the year, the amount of money received by the plantation owners for the 1915 product was nearly $600,000 (United States currency). Since January 1, 1916, the price has gradually declined to about 1,100 francs per 100 kilograms. If this price is maintained the market value of the 1916 product will be about $1,650,000.

Practically all this rubber has been exported to France. The war at first interfered with this exportation, and during the latter part of 1914 some of the leading producers were seeking a market elsewhere; but early in 1915 the French Government forbade the exportation of this product to any country except France, and Saigon rubber soon began to find a good market in the mother-country. The price soon began to rise, as shown in the preceding paragraph.

PRESENT STATUS OF PLANTATION RUBBER.

Enough has already been said to show that the production of plantation rubber is no longer an experiment in Cochin China. A few figures will show its present status and future prospects.

Status of the rubber plantations January 1, 1916.

Plantation.	Director.	Hectares in Plantation.	Hectares Planted.	Number of Trees.	Number Tapped.
PROVINCE OF BARIA.					
Société des Plantations de Courtenay	M. Sipiere	4,070	1,000	150,151	0
Long-hiep / Long-xuyen	Bonnefoy Freres	1,100	200	70,000	4,000
Others		5,019	310	97,518	0
Totals		10,189	1,510	317,669	4,000
PROVINCE OF BIENHOA.					
Ste. Agricole de Suzannah	M. Girard	3,400	872	300,000	100,000
Ste. des plantations d'Heveas de Xuan-loc	M. Luya	2,363	738	208,000	0
Ste. des P. d'Anloc	M. Girard	3,300	798	200,000	0
Ste. de P. de Caoutchouc de Cochinchine	M. Ferandy	2,472	730	187,500	0
Ste. Agricole de Thanh-tuy-ha	M. Desbordes	3,046	500	115,000	0
Ste. des P. de Tan-loc	M. de la Souchere	1,000	360	110,000	0
Others		13,713	1,577	426,000	24,000
Totals		29,294	5,575	1,546,500	134,000
PROVINCE OF GIADINH.					
Ste. Nouvelle des P. d'Heveas de Tan-thanh-dong	M. Guery	600	550	220,000	50,000
Ass'n Agricole de Tan-ninh	D. Jessula	400	400	120,000	0
Vinh-cu	M. Guyonnet	400	400	120,000	0
Vinh-phuoc	M. F. Filhol	412	365	102,000	15,000
Belland plantations	M. Chesnay	80	80	25,000	13,300
Others		2,349	1,610	684,648	0
Totals		4,241	3,405	1,271,648	78,300
PROVINCE OF TAYNINH.					
Ste. des Heveas de Tay-ninh	D. Jessula	2,460	1,277	403,000	15,000
Others		1,584	225	62,000	0
Totals		3,744	1,502	465,000	15,000
PROVINCE OF THUDAUMOT.					
Ste. des C. de l'Indochine (Loc.ninh)	M. Ectors	10,300	2,238	623,901	2,000
Ste. de P. d'Heveas de Xatrach	M. Jacque	1,100	600	220,000	160,000
Plantations Hallet:					
Xa-cam	M. Haffner	1,000	620	183,420	0
An-loc	M. Haffner	1,000	458	135,890	0
Others		4,500	625	157,252	6,700
Totals		17,900	4,541	1,320,463	168,700
ISLAND OF PHU-QUOC.					
Société d'Exploitation de Phu-Quoc	M. Lagrand	2,684	250	100,000	1,200
PROTECTORATE OF CAMBODIA.					
Plantation de Kep-plage	M. Dupuy	32	18	6,400	0

PROTECTORATE OF ANNAM.

Dak-Jappan, Riviere Verte — M. Deligneon, Quinhon	3,000	425	100,000	0
Suoi-giao — Dr. Yersin, Nhatrang	150	150	60,000	13,523
Others	500	98	43,000	0
Totals	3,650	673	203,000	13,523

RECAPITULATION.

Colony of Cochin-China:				
Province of Baria	10,189	1,510	317,669	4,000
Province of Bienhoa	29,294	5,575	1,546,500	134,000
Province of Giadinh	4,241	3,405	1,271,648	78,300
Province of Tayninh	3,744	1,502	465,000	15,000
Province of Thudaumot	17,900	4,541	1,320,403	168,700
Island of Phu-Quoc	2,684	36	100,000	1,200
Totals	68,052	16,393	5,021,330	401,200
Protectorate of Cambodia	32	18	6,400	0
Protectorate of Annam	3,650	673	203,000	13,523
Totals	71,784	17,084	5,230,730	414,723

PROSPECTIVE DEVELOPMENT. 1916-1920.

The following tables show the number of trees to be tapped during each of the years 1916-1920, inclusive. The increase in production will undoubtedly be relatively greater than the increase in the number of trees to be tapped, for, with each successive year after the present, the average age of the trees tapped will be progressively greater. In 1920 the annual production should amount to more than 1 kilo per tree, or a total of over 5,000 metric tons.

PROVINCE OF BARIA.

Plantation.	Trees to Be Tapped. 1916.	1917.	1918.	1919.	1920.
Courtenay	8,000	30,000	60,000	150,000	150,000
Long-hiep, Long-xuyen	12,000	24,000	44,000	78,000	80,000
Others	1,000	22,500	25,627	81,914	131,075
Totals	21,000	76,500	129,627	309,914	361,075

PROVINCE OF BIENHOA.

Suzannah	115,000	300,000	300,000	300,000	300,000
An-loc	75,000	140,000	150,000	200,000	200,000
Xuan-loc	26,000	40,000	60,000	80,000	110,000
Cochinchine	18,000	60,000	120,000	177,500	197,200
Thanh-tuy-ha	10,000	30,000	80,000	100,000	115,000
Tan-loc	65,000	110,000	110,000	110,000	275,000
Others	34,000	65,000	108,000	150,000	236,000
Totals	343,000	745,000	928,000	1,117,500	1,433,200

PROVINCE OF GIADINH.

Tan-thanh-dong	80,000	150,000	200,000	220,000	220,000
Tan-ninh	40,000	40,000	80,000	100,000	100,000
Vinh-cu	25,000	70,000	70,000	100,000	100,000
Vinh-phuoc	0	23,000	23,000	23,000	23,000
Belland	25,000	25,000	25,000	25,000	25,000
Others	26,700	122,300	285,066	420,442	635,524
Totals	196,700	430,300	683,066	888,442	1,103,524

PROVINCE OF TAYNINH.

Tayninh	60,000	200,000	400,000	400,000	400,000
Others	0	5,000	26,000	40,000	46,000
Totals	60,000	205,000	426,000	440,000	446,000

PROVINCE OF THUDAUMOT.

Locninh	47,995	242,745	487,553	597,659	620,000
Xatrach	160,000	200,000	200,000	250,000	250,000
Xa-cam	0	0	0	0	183,420
An-loc	0	0	0	0	135,890
Others	9,000	19,620	22,278	31,988	139,497
Totals	216,995	462,365	709,831	879,647	1,328,807

ISLAND OF PHU-QUOC.

Phu-Quoc	5,500	18,000	44,000	80,000	100,000

PROTECTORATE OF CAMBODIA.

M. Dupuy	800	2,800	6,400	6,400	6,400

PROTECTORATE OF ANNAM.

Dak-Jappan, Riviere Verte	0	10,000	25,000	60,000	100,000
Suoi-giao	16,000	20,000	30,000	50,000	60,000
Others	0	4,000	20,000	22,000	43,000
Totals	16,000	34,000	75,000	132,000	203,000

RECAPITULATION.

Plantation.	Trees to Be Tapped. 1916.	1917.	1918.	1919.	1920.
Colony of Cochin-China:					
Province of Baria	21,000	76,500	129,627	309,914	361,075
Province of Bienhoa	343,000	745,000	928,000	1,117,500	1,433,200
Province of Giadinh	196,700	430,300	683,066	858,442	1,103,524
Province of Tayninh	60,000	205,000	426,000	440,000	446,000
Prov. of Thudaumot	216,995	462,365	709,831	879,647	1,328,807
Island of Phu-quoc	5,500	18,000	44,000	80,000	100,000
Totals	843,195	1,937,165	2,920,524	3,715,503	4,772,606
Protectorate of Cambodia	800	2,800	6,400	6,400	6,400
Protectorate of Annam	16,000	34,000	75,000	132,000	203,000
Totals	859,995	1,973,965	3,001,924	3,823,903	4,982,006

FUTURE OF PLANTATION RUBBER.

The above calculation takes into consideration only the exploitation of the trees now planted, minus a certain allowance for thinning out. It is well to remember that only about 17,000 hectares are now planted. The full exploitation of the lands now in plantation would increase this amount to over 70,000 hectares, and this amount could easily be doubled. Then as the trees grow older, the production per hectare will at least double, even with a reasonable allowance for thinning out. So the ultimate maximum of rubber production in Cochin China cannot be placed below 80,000 to 100,000 metric tons per year, with an annual market value of at least $100,000,000.

SOURCES OF RUBBER STATISTICS.

The "Association des Planteurs de Caoutchouc de l'Indochine" issues a small publication of about 100 pages, which is mailed to foreign countries for 10 francs per year. This was originally a monthly publication, but it has recently been appearing only once in two or three months. Occasionally a special statistical number appears. The statistics of this report are obtained largely from the October-December, 1915, number (No. 49) and the special London 1914 and Taiwan 1916 numbers.

The monthly "Bulletin de la Chambre d'Agriculture de la Cochinchine," which now appears every two months, sometimes contains information concerning rubber conditions in Cochin China. This publication is about the size of the "Annales" referred to above. The subscription price to foreign countries is 12 francs per year. The "Bulletin Economique de l'Indochine," a semi-official economic review appearing six times a year, often contains valuable articles on rubber and other industries. It is published by l'Imprimerie d'Extreme-Orient, Hanoi, and mailed to foreign countries for 22 francs per year.

The "Bulletin Financier de l'Indochine" is a weekly paper published in Saigon at 25 francs a year for foreign countries. It contains current economic news and articles and is the chief advertising medium for rubber shares and other property. The decrees of the government of France and of Indo-China relating to rubber and other lands are published in the "Bulletin Administratif de la Cochinchine," which appears every week and will be sent to foreign countries for 20 francs a year, or about 20 cents (United States currency) for a single number. The land regulations quoted in this report are found in the numbers for January 22, 1914, and February 11, 1915.

Several pamphlets have been published on rubber production in Cochin China. Those consulted in the preparation of this report were: P. Morange, "Le Caoutchouc de Plantation en Cochinchine" (F. H. Schneider, Saigon, 1911); J. Lan, "Notice on the Hevea Brasiliensis in Cochin China" (F. H. Schneider, Saigon, 1911), and F. Ripeau, "Caoutchoucs Amazoniens et Asiatiques" (Emile Larose, Paris, 1914).

The export statistics of this report are based on the figures of the customs authorities of the port of Saigon. They are not always exact. Until 1913 no distinction was made between wild and plantation rubber, and the division given in this report is an estimate based largely on statistics of production. Exportation does not always agree with production. For instance, the oldest productive plantation—that of Suoi-giao—sometimes exports its product from Saigon, sometimes from Nhatrang and sometimes from Camranh.

Finally, much of the material of this report has been obtained by the knowledge of conditions gained by a two years' residence in Cochin China, by an extensive correspondence with the leading rubber producers of this colony and by personal observation during visits to the leading plantations.

Foreign Import Duties on Boots and Shoes.

THE following table, corrected to November 20, 1916, shows the foreign import duties on rubber boots and shoes of all descriptions, imported into the various countries from the United States.

Owing to the frequency of tariff changes the figures and information given in this table should be periodically verified. It is also advised that small trial shipments be made in order to test the rates prior to sending more extensive shipments.

In the first column is given the country, while the next column contains the articles with notes regarding surtaxes, basis of rates, etc. The third column specifies whether the weight is to be taken as gross or net and the last column gives the ad valorem duty or the rate of specific duty in United States currency.

Countries.	Articles and Remarks.	Weight.	Duty (U. S. Currency).
EUROPE:			
Austria-Hungary	Shoemakers' wares, with textile goods, per 100 pounds	Net	$11.05
Belgium	Manufactures of india rubber, ad valorem	Net	10%
Bulgaria	Ordinary rubber boots and shoes (galoshes), per 100 pounds (includes 20 per cent surtax)	Net	$10.51
	Other rubber boots and shoes, per 100 pounds (includes 20 per cent surtax)	Net	21.01
Denmark	Rubber boots and shoes, with textiles, per 100 pounds—including inner packing	...	6.08
France	Rubber footwear lined with felt, wool, or any partly woolen cloth, per 100 pounds	Net	13.13
	Rubber footwear lined with cotton, hemp, or flax cloth, per 100 pounds	Net	10.51
	Footwear with soles of rubber, per pair	...	0.14
Germany	Footwear, with or without rubber soles—Unvarnished, per 100 pounds	Net	7.56
	Varnished, per 100 pounds	Net	8.64
Great Britain	Manufactures of rubber	...	Free
Greece	Galoshes of rubber, per 100 pounds	Net	$30.78
Italy	Rubber footwear, lined or trimmed with stuffs, per 100 pairs	...	24.13
	Other rubber footwear, per 100 pounds	Net	4.38
Netherlands	Rubber footwear, ad valorem	Net	5%
Norway	Rubber footwear, per 100 pounds	Net	$12.16
Portugal	Rubber footwear, per 100 pounds	Net	19.22
Roumania	Rubber footwear, per 100 pounds	Legal	10.51
Russia	Rubber footwear, per 100 pounds	Net	26.35
Servia	Rubber footwear, per 100 pounds	Net	12.26
Spain	Rubber footwear, per 100 pounds	Net	26.26
Sweden	Rubber footwear, per 100 pounds	Net	14.59
Switzerland	Rubber footwear, per 100 pounds	Gross	2.63
Turkey	Rubber galoshes, boots and shoes	Net	10.50
NORTH AMERICA:			
Canada and Nova Scotia	Rubber boots and shoes, ad valorem, including war tax (7½%)	...	32½%
	Imports of articles invoiced at prices less than the market value in the country from which exported, are liable to a "dumping" duty if such articles are also made in Canada.		
Newfoundland	Footwear and all manufactures in part or in whole of india rubber or gutta percha, ad valorem, including 10 per cent surtax	...	44%
CENTRAL AMERICA:			
Costa Rica	Rubber footwear, per 100 pounds	Gross	$21.09
Guatemala	Boots and shoes, and overshoes of rubber or rubberized cloth, per 100 pounds	Legal	46.49
Honduras	Rubber boots, per 100 pounds	Gross	65.44
	Footwear of rubberized cloth, per 100 pounds	Gross	21.81
Nicaragua	Footwear of rubber such as waterproof boots and shoes, per 100 pounds	Gross	41.00
Panama	Rubber footwear, ad valorem	...	15%
Salvador	Rubber footwear, per 100 pounds	Gross	$46.14
WEST INDIES:			
Cuba	Rubber footwear with cotton fabrics, per 100 pounds	Legal	11.82
Santo Domingo	Rubber footwear	Net	11.35
SOUTH AMERICA:			
Argentina	Rubber footwear—includes surtax of 2%—duty based on valuation of $54.72 per 100 pounds	Legal	42%
	Footwear of cloth and rubber, with sole measures 25 centimeters (9.84 inches) or less, duty based on valuation of $2.96 per dozen, includes surtax of 2 per cent of valuation	...	42%
	Same footwear, larger sizes, duty based on valuation of $6.76 per dozen, includes surtax of 2 per cent	...	42%
Bolivia	Rubber footwear for men, surtax of 15 per cent is included, based on valuation of $14.00 per dozen pairs	...	$1.75%
	Rubber footwear for women and children: Overshoes, rubbers, boots, lined or not, including surtax of 15 per cent, based on valuation of $0.56 per pound	Legal	46%
	Footwear for women and children with exterior lining with or without interior lining, including surtax of 15 per cent, based on valuation of $0.88 per pound	Legal	46%
Brazil	Rubber footwear—nominally 3 milreis per kilo.—per 100 pounds	Legal	$52.85
Chile	Rubber footwear of all kinds, per 100 pounds	Net	33.11
Ecuador	Rubber footwear, including surtax of 125.5 per cent, per 100 pounds	Net	29.87
Paraguay	Rubber footwear, with sole measuring 25 centimeters or less, includes surtax of 1½ per cent of valuation, based on valuation of $5.79 per dozen pairs	...	63.5%
	Rubber footwear of larger sizes, based on valuation of $11.58 per dozen pairs	...	63.5%
Peru	Rubber footwear, including weight of inner packing; at ports of Callao, Salaverry, Paita and Pisco, surtax of 10 per cent, per 100 pounds	Legal	$32.76
	At other ports—surtax of 8 per cent, per 100 pounds	Legal	32.18
Uruguay	Rubber footwear, based on valuation of $5.17 per dozen pairs—surtax of 14 per cent of valuation included	...	62%
Venezuela	Rubber footwear, including surtax of 56.55 per cent, per 100 pounds	Gross	$34.26
ASIA:			
China	Rubber boots, per dozen pairs	...	0.73
	Rubber shoes, per dozen pairs	...	0.18
Japan	Rubber boots, per 100 pounds	Net	18.82
	Rubber shoes, per 100 pounds	Net	21.79
	Rubber overshoes, per 100 pounds	Net	19.43

Countries.	Articles and Remarks.	Weight.	Duty (U. S. Currency).
OCEANIA:			
Australia	Galoshes, rubber sand boots and shoes, and plimsolls, ad valorem	...	30%
	Rubber gum and wading boots, ad valorem	...	10%
New Zealand	Rubber footwear, ad valorem	...	33⅓%
AFRICA:			
South Africa	Rubber footwear, ad valorem	...	20%
With a minimum per pair of—			
	Men's	...	$0.18
	Women's	...	0.12
	Children's	...	0.06

Legal weight is not uniformly construed, but generally includes the weight of the immediate packing or container, though in some countries fixed tare allowances are made.

Foreign Import Duties on Rubber Tires.

THE following table, corrected to November 20, shows the foreign import duties on rubber tires of all descriptions imported into various countries from the United States.

The column marked "Weight" shows whether duties are levied on net or gross weight, or include simply the inner packings. The next two columns give the rate of the duty per 100 pounds in United States currency or the rate per cent ad valorem.

In this monograph the surtaxes have been included and the converted rates therefore indicate the actual duty payable.

Certain charges such as warehousing, customs handling, local taxes, revenue stamps, etc., are not included. The rates of duty shown, including the surtaxes as noted, should therefore be regarded as the minima. As changes in duties are likely to occur at any time, frequent verification of these figures is advised.

COUNTRIES.	Weight.	Rate per 100 Pounds, U. S. Currency.	Rate Per Cent.—Ad Valorem.
NORTH AMERICA:			
Canada	.....	.....	42.5
(Ad valorem duties are based on the fair market value of the articles when sold for home consumption in the country whence exported direct to Canada.)			
Central American States—			
British Honduras	.....	.....	15
(Duties based on price in the port of export.)			
Costa Rica	Gross	$4.22	.....
(In addition, there is a wharfage tax of 10.5 cents per 100 pounds.)			
Guatemala	Gross	7.21	.....
Honduras	Gross	4.28	.....
Nicaragua—			
Atlantic ports—Auto tires	Gross	3.81	.....
Solid tires	Gross	2.86	.....
Motorcycle tires	Gross	5.72	.....
Pacific ports—Auto tires	Gross	4.08	.....
Solid tires	.....	2.99	.....
Motorcycle tires	Gross	12.25	.....
(An increase of 33⅓ per cent of the duties is authorized but not in effect.)			
Panama	.....	.....	15
Salvador	Gross	13.81	.....
(A surtax of 1½ per cent of the duty is included.)			
Hawaii	.....	.....	Free
(Imports of foreign origin are subject to the provisions of the United States tariff.)			
Mexico	Gross	16.94	.....
(New rates in effect November 1, 1916.)			
Newfoundland	.....	.....	49.5
West Indies—			
British—			
*Antigua	.....	.....	13.33
†Bahamas	.....	.....	20
*Barbados	.....	.....	11.25
*Dominica	.....	.....	12.5
*Grenada	.....	.....	10
Jamaica	.....	.....	16.66
*Montserrat	.....	.....	13.33
*St. Christopher-Nevis	.....	.....	11
*St. Lucia	.....	.....	16.5
St. Vincent	.....	.....	15
Trinidad and Tobago	.....	.....	10
Turks and Caicos Islands	.....	.....	10
Virgin Islands	.....	.....	10
Cuba	.....	.....	25
Danish—			
St. Croix	.....	.....	16.5
(Duty, based on the invoice price, increased 25 per cent [on imports from St. Thomas, 15 per cent].)			
St. Thomas and St. John	.....	.....	6
(Duty, based on price F. O. B. at port of export.)			
Dominican Republic	Net	$36.29	.....
Dutch	.....	.....	3
French—			
Guadeloupe	.....	.....	6
Martinique	.....	.....	.....
(Rates not specified.)			
Haiti	.....	.....	22.24
Porto Rico	.....	.....	Free
(Imports from foreign countries are subject to the provisions of the United States tariff.)			
EUROPE:			
Austria-Hungary	Net	13.81	.....
Belgium—Solid tires	Net	5.69	.....
Auto tires	Net	10.16	.....
(Casings only.)			
Inner tubes	Net	14.88	.....
Bulgaria—Tires and tubes	Net	5.25	.....
Denmark—Auto tires	Net	6.08	.....
Solid tires	.....	.....	Free
Faroe Islands	.....	.....	Free
Finland—Auto tires	Net	9.55	.....
Inner tubes	Net	5.30	.....
France—Auto tires and tubes	Net	13.13	.....
Solid tires	Net	8.75	.....
Cycle tires	Net	21.89	.....
Germany—Auto tires	Net	6.48	.....
Inner tubes	Net	6.48	.....
Gibraltar	.....	.....	Free
Greece	Net	1.03	.....
Iceland	Net	0.24	.....
Italy—Auto tires and tubes	Net	5.25	.....
Malta	.....	.....	Free
Netherlands	.....	.....	5
Norway—Auto tires	Net	3.65	.....
Motorcycle tires	Net	3.65	.....
Portugal	Net	1.60	.....
(Conversion to U. S. currency is based on the latest quotation of the paper milreis.)			
Roumania—Auto tires	Legal	9.06	.....
Solid tires	Legal	4.90	.....
Russia	Net	18.82	.....
Servia	Net	10.51	.....
Spain—Solid tires	Net	17.51	.....
Casings and inner tubes	Net	23.64	.....
Sweden—Auto tires	Net	14.59	.....
Solid tires	Net	9.73	.....
Switzerland—Auto tires	Gross	0.44	.....
Solid tires	Gross	0.09	.....
Turkey	.....	15.00	.....
SOUTH AMERICA:			
Argentina	Legal	10.51	.....
Bolivia	Gross	20.29	.....
Brazil	.....	.....	11.64
Chile	Legal	41.39	.....
Colombia	Gross	0.93	.....
Ecuador	Legal	9.96	.....
Guiana—British	.....	.....	16.5
(When imported from the United Kingdom, Canada or Newfoundland, admitted at a reduction of one-fifth of the duty.)			
Dutch	.....	.....	10
French	.....	.....	5
Paraguay—Casings and inner tubes	.....	Free	.....
Auto tires	Legal	38.08	.....
Peru—Auto tires	Gross	24.28	.....
Other tires	Legal	36.42	.....
Uruguay	.....	.....	45
Venezuela	Gross	10.28	.....
ASIA:			
British—			
Aden	.....	.....	Free
Ceylon	.....	.....	5.5
(Duty based on wholesale cash price in bond, less trade discount at the port of entry.)			
Cyprus	.....	.....	10
(Duty based on export price with addition of cost of transport [including insurance] to the port of final discharge.)			

*When imported from the United Kingdom, Canada or Newfoundland, admitted at a reduction of one-fifth of the duty. The cost of packing is excluded, except in Dominica, St. Lucia and Grenada, where is it included.
†A surtax of 10 per cent is to be added.

COUNTRIES.	Weight.	Rate per 100 Pounds, U. S. Currency.	Rate Per Cent.—Ad Valorem.
Federated Malay States	.....	.....	Free
Hongkong	.....	.....	Free
India	.....	.....	7.5
(See note for Ceylon.)			
North Borneo	.....	.....	10
Sarawak	.....	.....	Free
Straits Settlements	.....	.....	Free
China	.....	.....	5
Chosen (Korea)	.....	.....	8
Dutch East Indies	.....	.....	10
French Indo-China	.....	.....	.....
(Imports from France are admitted free of duty, while imports from other countries are subject to the rates prescribed by the customs tariff of France.)			
Japan (including Formosa)—Auto tires..	Net	.....	25
Cycle tires.	Net	$42.92	.....
Persia	.....	.....	10
Siam	.....	.....	3
AFRICA:			
Abyssinia	.....	.....	10
Belgian Congo	.....	.....	10
British—			
Mauritius	.....	.....	12
Nigeria	.....	.....	Free
Union of South Africa	.....	.....	20
(Duty based on the current value for home consumption at the place of purchase, including value of packing and agent's commission if it exceeds 5 per cent.)			
Zanzibar	.....	.....	7.5
(The dutiable value of imports from Europe or America is taken to be the cost price [with charges], increased by 5 per cent or the invoice price [exclusive of charges], increased by 15 per cent.)			
Egypt	.....	.....	8
(In Alexandria a wharfage tax of one-half of 1 per cent is added. At other ports different rates are imposed.)			
French Algeria	.....	.....	.....
(Imports from France are admitted free of duty, while imports from other countries are subject to the rates prescribed by the customs tariff of France.)			
Italian—			
Eritrea	.....	.....	8
Libia	.....	.....	11
Somaliland	.....	.....	15
Liberia	.....	.....	12.5
Morocco	.....	.....	12.5
OCEANIA:			
British—			
Australia—Auto tires	.....	.....	35
Other tires	.....	.....	35
(Duty based on fair market value F. O. B. at port of export, plus 10 per cent. On casings weighing over 2½ pounds and inner tubes over 1 pound each, 48.6 cents per pound, if higher than the ad valorem rate.)			
New Zealand	.....	.....	Free
Guam	.....	.....	Free
(Imports of foreign origin are taxed 25 per cent of their value.)			
Philippine Islands	.....	.....	Free
(Imports of foreign origin are taxed 25 per cent of their value.)			
Tutuila	.....	.....	10

Legal weight is not uniformly construed but generally includes the weight of the immediate packing or container, though in some countries fixed tare allowances are made.

NEW JERSEY ZINC CO.'S PRICE NOTICE.

The New Jersey Zinc Co., New York City, announces the following prices on American process "Horse Head" brands of zinc oxide on contract for the first half of 1917:

	50 Ton Base	Carloads	Less Carloads
Selected, cents	10¼	10⅜	10½
XX, cents	9¾	9⅞	10

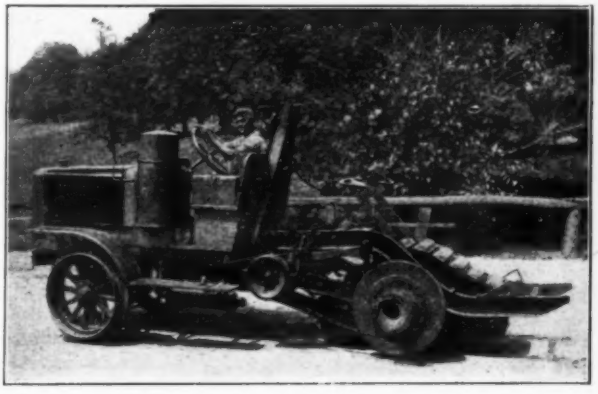
The above prices are based upon shipment in barrels and are f. o. b. shipping point, with usual freight allowance on carload lots, and are subject to change without notice.

The above products are also available in paper bags of 50 pounds net weight when shipped in carloads. In this container the price will be one-eighth cent per pound less than quoted above. Bags cannot be shipped in less than carload lots. Mixed carloads of barrels and bags cannot be shipped.

The American Chain Co., Bridgeport, Connecticut, manufacturer of Weed tire chains, has purchased the Standard Chain Co., Pittsburgh, Pennsylvania. Plans for combining the sales organizations and part of the office force of the two companies will probably be put into effect by January 1.

RUBBER-SHOD CATERPILLAR TRACTOR.

The development of the mechanical tractor has been a fertile field for the inventors of agricultural machinery who have endeavored to produce a machine that will satisfactorily solve the problems of plowing, cultivating, hauling and operating harvesting and other farm machinery. Compared with horsepower, the tractor has obviously the advantage due to its availability at all times and a more diversified range of usefulness.



The types of wheeled tractors are varied and accomplish the many objects for which they are designed in a generally satisfactory manner, providing the ground or road over which they operate is firm and fairly even. On soft ground and uneven and broken roads, however, the caterpillar tractor is supreme, as its tractive power is almost unlimited and it performs equally well on solid ground and smooth asphalt or macadam roads without injury to the surface of the road.

The modified form of caterpillar tractor shown here is designed for hauling heavy loads over roads and soft ground where wheeled tractors would be at a disadvantage. The shoes of the tractor belt are shod with 24 blocks of solid rubber that increase the tractive power on both hard and soft ground and prevent damage to the road surfaces. [Martin Rocking Fifth Wheel Co., Springfield, Massachusetts.]

RUBBER MAKES A SALVAGE MACHINE POSSIBLE.

William D. Sisson, a New York engineer, has designed a remarkable apparatus with which to explore the bed of the sea, locate wrecked vessels and bring them to the surface. The outfit consists of a tender carrying a number of pontoons, and an almost spherical diving machine equipped with propellers, searchlights, a telephone to communicate with the tender, and four powerful electro-magnets. The latter hold the diving machine fast to the metal side of the sunken ship while an electric drill bores holes for fastening the pontoons. The diving machine is designed to work at any depth down to 2,000 feet.

This device would not be possible without rubber, of which each of these outfits will probably use 3,000 pounds for electrical insulation purposes alone, not to mention the use of rubber hose and rubber mechanical goods on the ship's tender and the rubber or rubberized garments that the crews will need to wear while at their work of raising from the bottom of the sea the treasures that have been lost through storm, attack or accident in the years since iron and steel ships supplanted wooden ones in the world's commerce.

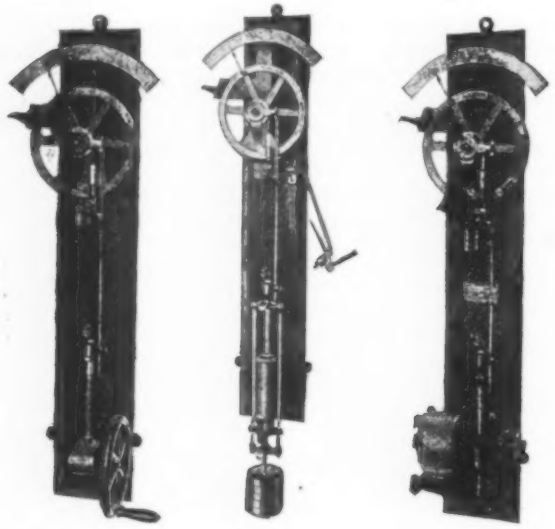
In this connection experiments have been carried on recently by Dr. Sylvio Pellico Portella in Rio de Janeiro, Brazil, using an apparatus somewhat similar to that noted above. An interesting feature is a series of floats of waterproof material, shaped like spheres, cylinders, etc., which are carried down by divers and attached to vessels and then inflated by air pressure from above.

New Machines and Appliances.

SINGLE STRAND TESTING MACHINES.

IT is very important to know the strength of individual strands that make up the fabric used in tire building. To meet this requirement the single strand testing machines shown here have been designed. They are constructed on the dead weight principle, without springs or delicate parts requiring attention. The one on the left is operated by hand, and is built with 10-pound capacity by ounces, and 20-pound capacity by ½ pounds. The intermediate one operates by weights, and has a 10-pound capacity by ounces. A motor-driven tester of 10, 20 or 50-pound capacity is shown on the right.

In each machine the drive is made by a non-revolving screw, operated by two spiral-cut gears held in a solid cast-iron housing and packed in grease. The recording head is built as a balance wheel, rotating upon two large, self-alining ball bearings, and is extremely sensitive. There are no gears or other moving parts to interpose friction, and the pointer is attached directly to the



HAND POWER. PLUNGER RELEASE. MOTOR DRIVE.

balance wheel, indicating the breaking strain on a metal dial-segment. The pointer is held in the exact position of the break by a roll clutch, which prevents backlash, and is released and reset by a small hand lever.

The clamps automatically hold the end of the finest yarns. The yarn is then passed over the eccentric, thereby obtaining additional clamping power and giving the tests all the advantage of the spool form without tying. Standard machines are arranged with a distance of 12 inches between spool centers. Loop tests are easily made with this equipment. A novel and easily read compensating stretch device is included on each machine, giving the net stretch at a glance. [Henry L. Scott & Co., Providence, Rhode Island.]

"HURRICANE" FIREPROOF AUTOMATIC DRYERS.

The vast quantity of plantation rubber now being produced in the Far East must perforce be dried before it is packed and shipped to the markets of the world. The problem of drying 108,000 tons, last year's production, must have involved much time, labor and incurred considerable cost to the producers. The automatic drying machine here illustrated is successfully used for drying a variety of wet materials analogous to crude rubber and therefore presents a suggestion worthy of consideration.

The machine is divided into sections and the heat is so regulated that the material finally emerges in a cool, dry condition. The dryer is divided longitudinally into two com-

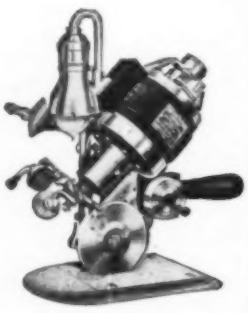
partments, one containing the heating coils and the other the endless chain conveyor that carries the material through the machine. Located in the upper part are the fans producing the recirculation of the air.

The drying is accomplished in accordance with the well-known counter-flow principle. The material is slowly carried through the dryer by the conveyor. The general movement of the drying air is directly opposite to this, as the fresh dry air is admitted near the delivery end of the machine. The air is constantly recirculated by the fans, alternately through the material and steam coils, and progresses in a spiral manner through the machine. During this process, the temperature of the air is gradually raised and its capacity for taking up moisture is thereby increased.

Thus the material as it enters the dryer in a cold, wet condition is subjected to the greatest amount of heat, and the greatest amount of evaporation is accomplished. The rapid evaporation of moisture tends to prevent the absorption of an undue amount of heat, so that no injury to the material can result at this stage. As it becomes drier and passes further through the machine, it encounters less and less heat, and is subjected to cooler and drier air. Near the end of the operation it comes in contact with fresh, cool, dry air, so that the final moisture is readily removed and the material delivered dry and cool. [The Philadelphia Drying Machinery Co., Philadelphia, Pennsylvania.]

THE EASTMAN ELECTRIC CLOTH CUTTER.

Motor-driven cloth cutting machines are labor saving devices that could hardly be dispensed with by manufacturers of rubber clothing and other apparel of a like nature. That these machines have a wider field of usefulness is shown by the increasing call for motor-driven cloth cutters from manufacturers of gaskets and automobile tires.

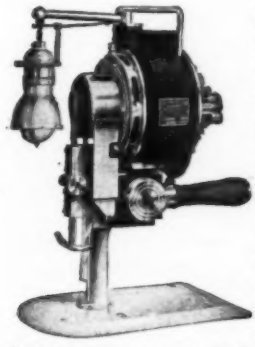


The machine shown in the first illustration is of the reciprocating knife type and built to operate on 110 or 220-volt direct or alternating current. It is equipped with a powerful motor and all bearings are a combination ball and roller bearing type which divides the wearing strain over a large surface and reduces wear and tear to the minimum.

This machine is recommended for all-round work where the lays are higher.

It will cut curves or straight lines equally well in material varying from the lightest silk to the heaviest cotton fabric.

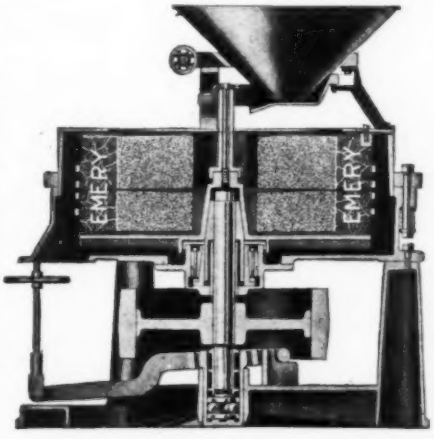
The round knife type shown in the second illustration is also operated on either 110 or 220-volt direct or alternating current. A notable feature of this machine is the standard, which is so arranged that as the knife wears down it can be lowered into the plate. This makes the blade last longer and insures accuracy of workmanship, as the edge of the blade is always kept close to the throat-plate. It has a knife guard which is a positive protection against the operator cutting himself.



The adjustable sharpening device is arranged so that both sides of the blade are sharpened simultaneously, thereby doing away with any wire edge on the knife. Moreover, the sharpening device is adjustable so that the operator can obtain any kind of bevel he prefers. [Eastman Machine Co., Buffalo, New York.]

THE STURTEVANT DUST GRINDER.

That the grinding principle of the ancient mill-stone had long since been replaced by newer machines of modern design and construction was a reasonable supposition. That such is not entirely the case, however, is indicated by the accompanying illustration of a modern grinder with upper and nether mill-stones of rock emery. It is the more interesting from the fact of its comparatively recent adaptation for comminuting hard and soft rubber and grinding leather scrap for making leather and rubber soles.



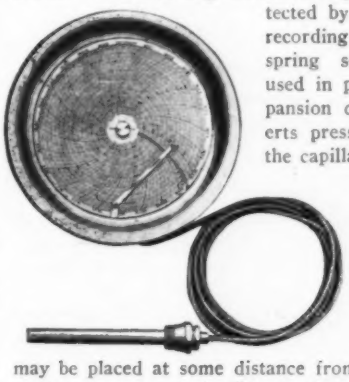
The upper, or bedstone, is bolted to the top casing and is lowered with it directly upon the lower, or runner stone. The clamping ring is next tightened to hold the bedstone case and stone immovably in position and the runner is then lowered away from the bedstone by a hand wheel which regulates the fineness of grinding required.

As in the old principle the material is fed at the center and is gripped between the mill-stones, passing through a continuous rubbing, shredding and tearing action as it works its way by centrifugal force to the periphery where it is discharged into a suitable receptacle.

A duplicate plant consisting of four 42-inch horizontal mills and four special screens, recently installed, has produced, it is claimed, 12,000 to 13,000 pounds of 40-mesh soft rubber dust per day from one unit. That scrap leather and hard rubber may be successfully ground on this machine is obvious. The 42-inch mill is 5 feet long, 5 feet wide and 5 feet high, weighs 5,500 pounds, gross, and requires 18 horse-power. [Sturtevant Mill Co., Boston, Massachusetts.]

VULCANIZER RECORDING THERMOMETER.

A new type of thermometer for recording vulcanizing temperatures up to 800 degrees F., or 425 degrees C., which embraces a number of original features, is shown here. It operates on the principle of the expansion of gas with change in temperature. A bulb of copper containing nitrogen gas under pressure is connected to a recording instrument by a small copper tube protected by flexible steel tubing. The recording instrument has a helical spring somewhat similar to that used in pressure gages, and the expansion of the gas in the bulb exerts pressure which is conveyed by the capillary tube to the helix, which expands proportionately. This helix is directly connected to a recording arm and pen which marks on the record chart. Tubing as long as 100 feet can be furnished, if required, so that the recording gage may be placed at some distance from the point where the temperature is measured. The clock which revolves the chart is mounted directly on the front plate on which the chart rotates, insuring alinement of the clock and chart plate.



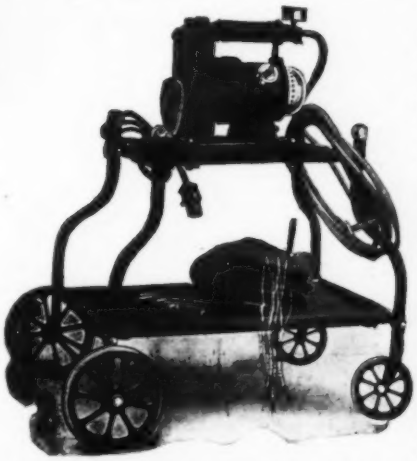
The clips holding the chart in position are mounted on the door so that when the door is opened they are automatically swung away from the chart, permitting its easy replacement without interference.

A device is furnished which raises the chart pen from the chart automatically when the door is opened, and frees the pen automatically when the door is closed.

This instrument is also made in indicating form, where desired, to indicate the temperature on a dial instead of recording it on a chart. Several different types of bulbs may be had, either with threaded connection for insertion in mains and pipes, or with lead coating to withstand chemicals and acids. [The Brown Instrument Co., Philadelphia, Pennsylvania.]

A PORTABLE ELECTRIC TIRE PUMP.

The Lectroflater principle apparently reduces the annoyance of tire inflation to the minimum. The carriage outfit shown in the illustration is a combination of a universal motor that will run on either alternating or direct current, a high-pressure air compressor, a gear box and a condensing chamber, so arranged that all elements are enclosed in a single housing and automatically cooled. It is mounted on a strong, light carriage that is provided with a convenient tool tray and equipped with four rubber-tired wheels.

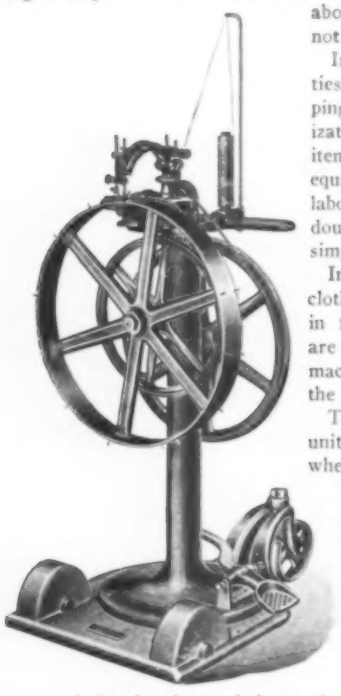


This outfit has been especially designed to meet the demand of public garages, tire sales rooms and other public places which must dispense free air, but wish to avoid the larger investment, higher operating expenses and loss of space required by large compressor and tank systems.

Each machine is fitted with a long electric cord, attachment plug, gage, high-pressure hose and quick-acting coupling. It will operate from any 110-volt lamp socket and is guaranteed to develop 125 pounds air pressure without overheating. It has a displacement of about 2½ cubic feet of air per minute and will inflate the largest tires to 100 pounds pressure in one or two minutes. [The Black & Decker Manufacturing Co., Baltimore, Maryland.]

A PORTABLE FOOT-POWER SEWING MACHINE.

Here is a light, portable foot-power sewing machine that can be used in any department of a rubber mill where end-piece sewing is required. It is self-contained and designed for moving about when the use of power is not practical nor convenient.



In tire plants where quantities of rags are used for wrapping the treads during vulcanization, end-piece sewing is an item that includes necessary equipment and considerable labor, both of which could doubtless be reduced by this simple machine.

In footwear factories where cloth books are a necessity and, in fact, wherever cloth liners are used, the need of a sewing machine for joining together the ends is apparent.

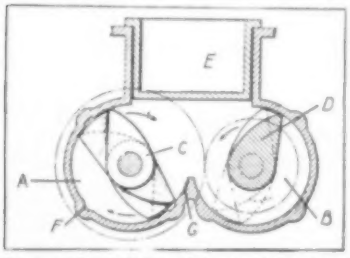
The ends of the cloth to be united are laid on a large feed wheel that is provided with holding pins which maintain the two pieces of cloth in relative position and at the same time permit the cloth being stitched during the sewing operation. It is arranged so that the feed wheel can be instantly thrown out of gear and thereby short stitches and the breaking of needles are entirely obviated.

This machine will sew all kinds of cotton or woolen goods, thick or thin, wet or dry, and is carefully constructed. [Dinsmore Manufacturing Co., Salem, Massachusetts.]

MACHINERY PATENTS.

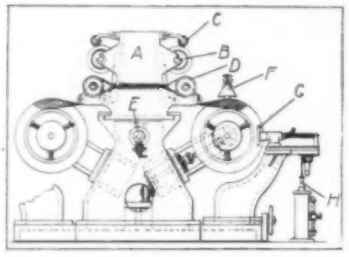
THE BANBURY MASTICATOR.

THIS machine is of the Pointon type and provided with revolving blades which act in conjunction with stationary surfaces imparting a kneading action to the mass. The drawing is a cross section of the machine, which is duplex in character, comprising two cylindrical casings *A* and *B* in which the two rotors *C* and *D* revolve towards each other. The rubber being placed in the hopper at the top, is fed by the weight of plunger *E* to the rotating blades. The inclined blades of the rotors force the material continuously from the ends of the machine to the center, rolling and kneading the rubber against the walls of the cylindrical casings until it is thoroughly massed. The casing walls may be smooth, as shown on the right, or provided with grooves shown at *F;* moreover, the entire surface may be serrated as shown at *G*. [Fernley H. Banbury, East Orange, New Jersey, assignor to Birmingham Iron Foundry, Derby, Connecticut. United States patent No. 1,200,070.]



PNEUMATIC TIRE BUILDING MACHINE.

The old-time hand method of building tire casings has long since proved to be unequal to the present high production standards. The development of tire building machines has therefore progressed steadily and the modern American type is almost entirely automatic. The strips of frictioned fabric are supplied under tension to the revolving core and the successive plies smoothed down by rollers.

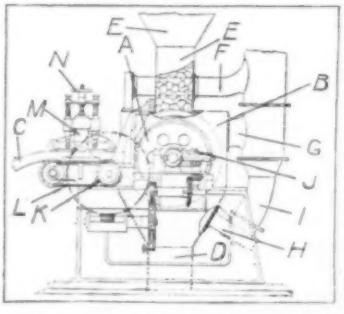


Paridon's invention, however, possesses certain novel features that are radical departures from the customary design and are therefore interesting.

The drawing is an end elevation of the machine, which is duplex in construction. The description applies to both units, but will be confined to the one on the right. There are four frames, only one being shown at *A*, which support two sets of fabric rolls *B*, liner rolls *C* and tension rolls *D*. The frames are moved longitudinally to bring the fabric rolls alternately in line with the core by a reciprocating hydraulic piston *E*, operated by a four-way valve. As the fabric strip is applied to the core, adhesion of the successive plies is assisted by a jet of air from the nozzle *F*. The two smoothing rollers *G* are operated by rack and pinion movement controlled by the vertical hydraulic piston *H*. The front faces of the smoothing rolls are recessed with convolute openings through which air is forced, materially aiding the stitching operations and preventing the formation of air bubbles between the fabric plies. [Michael Paridon, assignor of one-half to Henry A. Rudd, both of Barberton, Ohio. United States patent No. 1,202,884.]

RUBBER DUST GRINDING MACHINE.

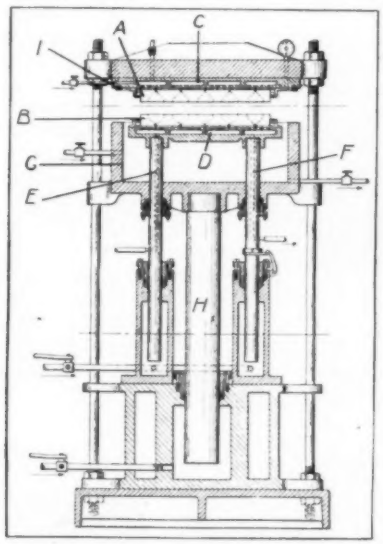
The Gardner machine for reducing rubber to fine powder is of the type in which an abrasive cylinder is rotated and which at the same time receives an axially reciprocating motion. The cylinder *A* is formed with a series of abrasive strips set longitudinally on its periphery, between which, openings are arranged for the flow of air forced outwardly by internal fan blades. The cylinder is mounted in a casing *B* provided with openings for the feed of the material *C*, a hopper *D* at the bottom which receives unground fragments, and a hopper *E* at the top by which the unground fragments are returned to the grinding-cylinder. The casing and the upper and lower hoppers are connected by screened pipes *F*, *G*, *H* with a suction trunk pipe *I* leading to a draw-off fan and receptacle for the rubber dust. The axle of the cylinder is reciprocated by a bell-crank lever *J* operated by worm gearing, connected



by a shaft and gearing to the main drive shaft *K*. The feed-mechanism consists of an endless belt *L* provided with projections and spring-pressed rollers *M* that are adjusted by hand wheels *N*. [C. E. Gardner, Gloucester, Gloucestershire, England. British patent No. 10,015 (1915).]

MACHINE FOR MOLDING AND VULCANIZING HOLLOW RUBBER ARTICLES.

According to this invention the method of making rubber bulbs is simplified and the production materially increased. Briefly, the operation consists in drawing the stock by vacuum into the mold cavities, the edges of the two halves of the bulb being then brought into close contact and vulcanized.



The drawing is a vertical section of the machine, which is a three-ram type of hydraulic press. The mold plates *A* and *B* comprise 25 mold cavities, each being provided with a small opening communicating with air chambers *C* and *D* in the upper and lower head.

Two metal plates, adapted to support the disks of rubber stock, are placed back to back and inserted between the mold plates where they are alined by dowel pins. The mold is then closed by the hydraulic rams *E* and *F* and a vacuum applied to the air chambers, exhausting the air in the mold cavities and thereby drawing the rubber stock into them. When the bulb halves have thus been molded, the mold is opened and the metal plate removed. Then the hollow platen *G* is moved upward by the ram *H* until it contacts with the sealing gasket in the upper platen. Air under pressure is admitted to the hollow platen, filling the mold cavities, and then the lower mold is raised by the rams *E* and *F*, thereby closing the mold, uniting the bulb halves and entrapping a certain amount of compressed air. The bulbs are vulcanized by exhausting the air and admitting steam to the chambers surrounding the mold. [Fred T. Roberts, Trenton, New Jersey, United States patent No. 1,201,503.]

A more recent invention by the same inventor provides a process and apparatus for releasing hollow inflated articles from the molds. [Fred T. Roberts, assignor to the Aranar Co.—both of Cleveland, Ohio. United States patent No. 1,201,627.]

OTHER MACHINERY PATENTS.

THE UNITED STATES.

1,201,397. Tire repair vulcanizer. F. S. Wahl, North Tonawanda, assignor of one-half to G. G. Mattern, Kenmore—both in New York.

1,201,406. Apron for mixing mills. H. A. Welton and H. J. Hoyt, assignors to Morgan & Wright—all of Detroit, Mich.

1,201,473. Device for painting golf balls. C. H. Lambert, Asheville, N. C.

1,201,774. Machine for constructing a laminated cohesive interwound fabric band. L. A. Subers, East Cleveland, Ohio.

1,201,778. Tire mounting implement. W. L. Weber, assignor to The Es-cenkay Products Co.—both of Chicago, Ill.

1,202,452. Tire rim tool. I. B. Stroud, Pass Christian, Miss.

1,202,654. Rim tool. F. A. Berry, Loudon, Tenn.

1,204,021. Portable vulcanizer. E. T. Horsey, Cleveland, Ohio.

1,204,213. Tube wrapping machine. J. A. Vey, assignor to Continental Rubber Works—both in Erie, Pa.

1,204,342. Machine for wrapping hose and similar articles. H. Z. Cobb, Winchester, Mass., assignor to Revere Rubber Co., Olneyville, R. I.

1,204,357. Apparatus for treating fibrous materials. E. D. Jefferson, Boston, Mass.

THE DOMINION OF CANADA.

171,104. Tire rim tool. The Burrill Tire Tool Co., assignee of F. H. Burrill—both of Concord Junction, Mass.

171,174. Tire rim tool. A. A. Friestedt, Chicago, Ill.

171,440. Machine for winding tape on wire. Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of T. Midgley, Lancaster, Ohio.

171,637. Rubber heel mold. J. G. Tufford, Elyria, Ohio.

171,656. Flap trimming machine. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of T. Midgley, Lancaster, Ohio.

THE UNITED KINGDOM.

9,039 (1915). Apparatus for treating rubber latex. S. Milne, 11a Grange Road, Edinburgh.

9,427 (1915). Tool for tapping rubber trees. F. E. Lease, Sapong Estate, British North Borneo.

9,454 (1915). Pneumatic tire mold with expansible ring. F. A. Byrne, 2 Ludgate Hill, Birmingham.

101,325. Guards for rubber mills. L. Gaisman, 106 Birch Lane, Longsight, and S. Dreyfus, Thorncliffe Villa, Windmill Lane, Denton—both in Manchester.

101,395. Rubber tapping tool. S. Johno, 401 North Bridge Road, Singapore.

101,416. Rubber pad in sole laying machine. Atlas-Werke Pohler & Co., Stotteritz, Leipzig, Germany.

THE FRENCH REPUBLIC.

480,512 (December 23, 1915). Improvements in cores used in vulcanizing. Heinig Johnston and Ohls.

480,583 (December 31, 1915). Improvements in apparatus for molding tires. J. H. Coffey and Coffey, Jr.

PROCESS PATENT.

ELIMINATING POROSITY IN RUBBER SOLES. The parts comprising the bottom being assembled, they are placed in a chamber and subjected to a temperature of 130 to 135 degrees F. for 36 hours, thereby eliminating all air, naphtha or other entrapped gases. The bottoms are then attached to the upper and the boot or shoe is vulcanized. [W. Mellersch-Jackson, London, England. (Communication from Boston Rubber Shoe Co., Malden, Massachusetts.) British patent No. 16,226 (1915).]

OTHER PROCESS PATENTS.

THE UNITED STATES.

1,202,244. Process of manufacturing brushes. A. H. Timmis, Harrow, assignor to Rubber Set Brush Co., Limited, London—both in England.

THE DOMINION OF CANADA.

171,196. Process for the manufacture of tire fabrics. L. Lias, Paris, France.

THE FRENCH REPUBLIC.

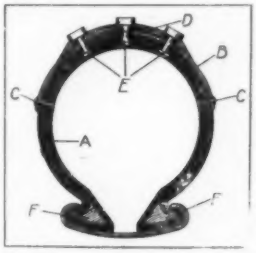
480,713 (January 19, 1916). Process for manufacturing rubber eye-glass frames without seams and without using a mold. E. Kalker.

480,735 (January 20, 1916). Elastic fabric adapted to masks for protection against asphyxiating gas; to suspenders, corsets, orthopedic articles, etc., and process for its manufacture. L. Brun.

MISCELLANEOUS PATENT.

A FRENCH STUDDED-TREAD TIRE.

In this tire the use of rubber has been avoided as much as possible. The casing is built up in the usual way, of several plies of frictioned fabric. On this is fitted a protecting cover made of leather or similar material and provided with metal studs.



Referring to the cross-section of the tire, *A* is the casing and *B* the leather protecting cover which is held in place by rivets *C*.

The leather tread *D*, which may be made of other material than rubber, if desirable, is fastened to the protecting cover by stud-rivets *E*, which extend through the fabric plies. The beads *F* are made of leather, or similar material, and applied to the casing in the usual manner. [K. Pauli and Benniger. French patent No. 480,166 (July, 1915).]

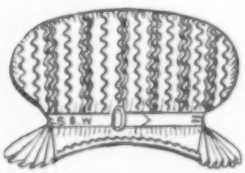
New Goods and Specialties.

JOHNSON'S HEEL PROTECTOR.

WOMEN who drive their own cars will be interested in the patented device shown herewith, for guarding the heel of the most delicately shod foot from all danger of scuffing while manipulating the pedals. The neat appearing shield of patent leather, lined with cream-colored kid, is shaped to fit a feminine style of heel. Across the lower edge is an elastic band about three-quarters of an inch wide, which can be slipped over the heel of the wearer's shoe, and a longer strap made partly of elastic and partly of patent leather, is sewn to the upper part of the guard on one side and detachably fastened to the other by a metal clasp. [C. H. Wolfelt Co., Los Angeles, California.]

NON-BREAKABLE BATHING CAP.

The bathing cap illustrated here shows several novel features. It is made of a new and original rubber fabric, wave-striped in contrasting colors, the result being an attractive material particularly adapted to the purpose. The head-band is of a sort specially intended for use where it may be subjected to moisture. Elastic webbing is encased completely with rubber and vulcanized, thus producing a thoroughly waterproof elastic tape. The claim is that the rubber threads, protected from air and moisture, will retain their elasticity and consequent durability for a much longer time than would similar fabric not so protected. This elastic, non-breakable tape is also to be used for garters, belts, hose-supporters, suspenders and skirt-facings. [S. & W. Rubber Manufacturing Co., Inc., College Point, New York.]



"SAFETY FIRST" HAND SIGNAL.

The familiar method of signaling with the outstretched hand in automobile driving, when about to stop, slow down or turn a corner, is made effective at night as well as by day by means of a small electric lamp attached to the hand or wrist of the driver, after the manner of a wrist watch, by an elastic band which holds it firmly in place. This two-candle-power, 6 to 7-volt lamp obtains the necessary current through a small cord from a socket in the dash board, and consumes so little that it can be kept lighted at all times and ready for use whenever the driver has occasion to signal. A lamp of different voltage may be substituted, if desired.

The entire equipment is so small and light that its presence on the back of the hand is scarcely noticed by the wearer. It is three inches in diameter and one inch thick. The one-inch ruby bull's-eye in the center is surrounded by the word "Safety First," cut in the polished nickel case and showing clearly through a lining of white celluloid. [Pittsburgh Electric Specialties Co., Pittsburgh, Pennsylvania.]

BEECHING'S MOISTENER.

The construction of this novel moistening device is simple and effective, needing no adjustments. A soft rubber sleeve completely encircles the glass water container, thereby avoiding all danger of defacing the most delicately finished desk or table. As will be seen in the illustration, the openings in the rubber are surrounded by slight rings or curbs, so that all of the water does not run back into the container, a thin sheet of moisture being held for use. Another curb surrounds the moistening space, and should the rubber carry up more than the necessary quantity of moisture, small ridges or curbs guide the surplus water back into the receptacle. The moisture is renewed instantly by a slight pressure on the rubber sleeve. [Kimpton, Haupt & Co., New York City.]

ALL RUBBER TOBACCO POUCH.

A dark gray, circular rubber bag, 5½ inches wide and 5 inches deep, affords a handy, flexible receptacle for tobacco which can be easily carried in the pocket. This bag has a strongly made stitched seam at the lower edge and a band of black fabric at the top, through which is run a narrow black cord, which acts as a drawstring. [United Cigar Stores Co., New York City.]

A NEW DENTAL RUBBER.

Ordinarily, dental rubbers are manufactured from a standard formula, merely by weight, but this improved rubber, intended as a base mounting for porcelain teeth, is prepared according to a special formula, balancing each individual ingredient. It is claimed that the resultant product shows minimum shrinkage, maximum density, takes a high luster with little effort, and remains almost permanent in color, the only change affecting it being solarization; also, that this is the only dental rubber that gives perfect adaptation in the retention spaces of the teeth, hugging tightly any part of the porcelain with which it comes in contact and thus elim-

inating pockets in which food might accumulate. Rubbers made according to this formula are supplied in various colors acceptable to the dental profession. They are not affected by climatic change and can be packed in cases either cold or hot. No foreign materials, such as oils or waxes, are employed to insure plasticity, which is accomplished by purely mechanical means. [The S. S. White Dental Manufacturing Co., Philadelphia, Pennsylvania.]

THE LORETTA LAST, "STRAIGHT-LINE" RUBBER.

The rubber shown here is a handsome one, designed to fit over the latest models of this season's leather footwear for women. It has a medium broad toe of moderate height, and is intended to be worn with the full Louis or Cuban heeled boots. The vamp is of generous height, while the back is sufficiently high to cover the quarter of the shoe or boot over which it is worn. The sole is "rolled edge" and runs in an unbroken piece from the toe up under the instep, along the face of the heel, and thence along the tread. The reinforcements are generous, and the finish such as to commend it to critical buyers. [The B. F. Goodrich Co., Akron, Ohio.]

ROUDEN ICE BAGS.

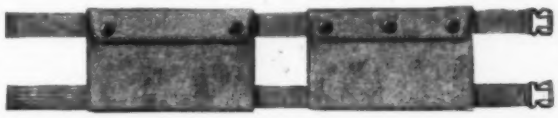
A highly useful article, formerly confined to European manufacture, but now made in America and supplied to European and South American trade, is the ice bag shown in two styles in the accompanying illustration. These bags are made in red, checked and brown rubberized materials of excellent quality, and are furnished in no less than 20 sizes, including the centimeter sizes required in Europe and Latin America. The neck of the bag is worked on the collar of a screw cap of zinc metal in a manner that insures permanence. Before leaving the factory, each bag is tested to a pressure of 200 to 300 pounds. [Rouden Manufacturing Co., New York City.]

HUGHES "IDEAL WATERPROOF" HAIRBRUSH.

The Hughes "Ideal" hairbrush, with bristles set in a rubber pad, has been on the market for many years. Continued experiments have been made, however, with a view to perfect its lasting and sanitary qualities, and an improved model, here shown, is now offered under the trade name of Hughes "Ideal Waterproof." It is claimed that there is nothing in this brush that water can loosen, rust or destroy and it can, therefore, be thoroughly cleansed as frequently as desired. Short and long stiff boar bristles are vulcanized into a cushion of rubber, which is automatically fastened to the handle so that it cannot loosen. The handle, although highly polished in dark mahogany finish, is waterproof and retains its luster after washing. [Henry L. Hughes, New York City.]

"BOODLE BAG" WITH ELASTIC BANDS.

This safeguard device for money or other valuables is secured by two elastic bands fitted with stout clasps, attached about the leg just below the knee, underneath the stocking. The container is in two sections, thus avoiding any necessity for a bulky and uncomfortable projection when filled. These two flat, oblong cases are made in all varieties of material, from serviceable poplin to the daintiest of silk brocades, and are fastened by means of a flap with metal clasps. The "boodle bag" is an exceptionally presentable article, of great convenience for both men and women when traveling, bathing, golfing, etc. [Boodle Bag Co., Chicago, Illinois.]



SPONGE RUBBER CORN SHIELD.

It is generally understood that corns originate from the pressure of ill-fitting shoes and that to remove that pressure eliminates the trouble. A new corn shield designed for this purpose consists of a ring of sponge rubber, one side of which is porous, the other smooth, and made in various thicknesses to suit the case. This material offers a yielding surface and yet does not pack down as do other pads, and it is claimed that these shields will keep fresh and last indefinitely. The same shield can be removed and applied as often as desired, and can be readily cleansed with warm water and soap.

In using this shield, a small amount of Lexel adhesive gum is applied to the smooth side and allowed to dry for not less than a minute, after which it is placed next to the flesh. [Lexel Foot Ease Co., Ashland, Ohio.]

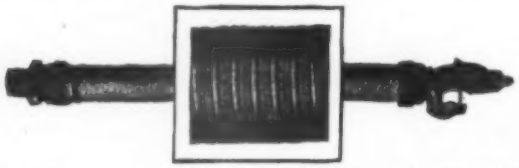
SUCTION SINK STOPPER.

Stoppers for sinks, set basins and bath tubs are usually made of metal or rubber, and are intended to fit tightly. But as a result of constant wear they become more or less bothersome. Stoppers which depend not upon tight fit, but upon suction or pressure, are made of red rubber in various sizes. There is a plug, which may fit more or less perfectly into the outlet; this, however, being simply to hold the stopper in place. The actual retention of the water is accomplished by its own pressure on the large, flexible rubber disk forming the top of the stopper. The metal post, holding the ring, is molded in the rubber, and will not work loose nor allow leakage through the fitting. [The Durst Manufacturing Co., Inc., New York City.]

"GOODALL SEMI-METALLIC" HOSE.

For severe service and for use under high pressures of steam, air, water, etc., the most satisfactory hose should contain the virtues of both metal and rubber; that is, it should have the

strength and durability of steel, the flexibility of rubber, and be capable of being twisted and turned with little effort and yet without kinking. In the semi-metallic hose shown herewith, a rubber tube overlaid with fabric, similar in construction to the



usual rubber hose, is encased in steel armor. It is claimed that this hose will withstand the highest pressures and render exceptionally long service, being fully protected from external injury while retaining the pliability of an all rubber hose. [Goodall Rubber Co., Inc., Philadelphia, Pennsylvania.]

MOTORCYCLISTS' CLOTHING.

There is no mode of travel as hard on wearing apparel as motorcycling, nor as hard on the cyclist if he be inadequately protected. The force of the wind striking against his body is

tremendous, and air and the dust of the road insinuate themselves into every pore. The stoutest waterproof material, capable of withstanding the most adverse elements, must necessarily be used. Improvements are constantly being made in motorcyclists' clothing, both in fabric and style, and the English and

French today are leaders in practical wearing apparel for this purpose. The upper illustration shows the latest styles in seatless trousers and leggings, and below are new motorcycle coats, both single- and double-breasted, with a rear view of the double-breasted model. [The North British Rubber Co., Limited, Edinburgh, Scotland.]

FOUNTAIN PEN WITH SNAP LOCK LEVER.

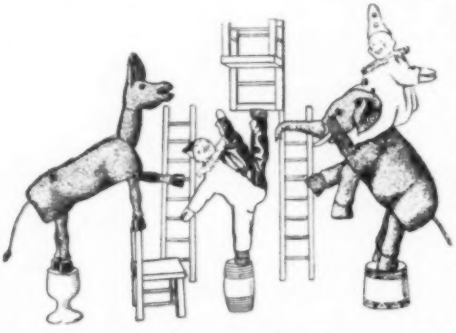
The special feature of this fountain pen is contained in the improved snap-lock device in the body of the pen, consisting of a raised portion of the metal collar vulcanized in the barrel, and engaging a corresponding groove in the section, holding it firmly in position. By operating the lever with a finger nail stop, shown in the accompanying illustration, the ink reservoir is entirely compressed, thereby preventing the twisting of the sac and consequent trouble when refilling the pen. Other lever-type fountain pens depend on the aid of the pressure bar to operate the lever, but this lever operates by itself independently of the pressure bar.

An entirely new method of fastening the clip to the cap has also been employed. Arms of the clip are inserted in the cap and immersed in a soft substance, which, after being treated by a patented process, is changed to a rock formation anchoring the clip in such a manner as to distribute the strain and prevent the clip from ever becoming loose.

This pen is claimed to be non-leakable, the shoulder fitting tightly against the end of the barrel and forming an air-tight and ink-tight chamber. [Kraker Pen Co., Kansas City, Missouri.]

"MADE IN AMERICA" TOYS.

The fact that we are cut off from foreign toy markets on account of the European war adds new interest to toys of American manufacture. The A. Schoenhut Co., Philadelphia, Pennsylvania, is the maker of "Humpty Dumpty Circus" toys,



comprising an infinite variety of miniature animals, circus actors and paraphernalia which can be posed in all the "stunts" known to real performers under the Big Tent, as well as some unheard of on land or sea. These laughter-provoking toys are made of wood and leather, their remarkable flexibility being attained by the use of rubber cords in joining together the different parts of the animals and figures.

The "Rolly Dolly" toys, one of which is also shown, are grotesquely amusing figures of practically unbreakable construction and painted with oil colors and heavy enamel varnish so that the paint will not come off. The head of the toy is attached by a rubber cord, causing it to wag in a droll fashion as the toy is rolled about. The "Rolly Dollys" are made in various sizes, from 6¼ to 10½ inches high.

The Editor's Book Table.

THE STABILITY OF VULCANIZED RUBBER AND THE OPTIMUM CURE. By Henry P. Stevens, M.A., Ph.D., F.I.C. Reprinted from "The Journal of the Society of Chemical Industry," London, England.

THIS pamphlet, of value to every manufacturer of vulcanized rubber, recapitulates the common knowledge of the subject, such as the danger of over-curing with consequent hasty deterioration of the vulcanized product, the tendency toward under-curing in order to prolong the life of the product and the fact that this also causes gradual deterioration. The methods of Schidrowitz and of Eaton and Grantham to determine the temperature, period of heating, etc., which will yield the perfect or optimum cure are explained, and it is pointed out that both methods fail to take into consideration the fact that the tensile properties of a vulcanized rubber vary with the age of the specimen. Figures obtained in any sort of tensile or stretching tests will vary accordingly, inasmuch as vulcanization appears to continue very slowly at the temperature of the air. Thus Dr. Stevens concludes that any optimum cure method based only upon load and elongation figures is valueless for technical purposes; rather that it should be based upon a correlation of physical properties and aging tests.

Then follows a corroboratory description of exhaustive experiments with tabulated results, which were more fully referred to in THE INDIA RUBBER WORLD, October 1, 1916. In studying these it is particularly interesting to note that the crêpe rubber compounds cured for 3, 3½ and 4 hours all show greater deterioration over any given period than the corresponding sheet rubber compounds. This Dr. Stevens attributes to the method of preparation. Whereas sheet rubber is merely squeezed after coagulation and retains the original shape of the coagulated rubber, crêpe rubber is put several times through a washing mill where it is torn up and ground in a stream of water. In his experience, the extent to which rubber is worked previous to vulcanization tends to reduce the life of the vulcanized product.

THE FUNCTION OF LITHARGE IN THE VULCANIZATION OF RUBBER, Part II. By Henry P. Stevens, M.A., Ph.D., F.I.C. Reprinted from "The Journal of the Society of Chemical Industry," London, England.

Dr. Stevens here reviews and discusses the investigations which have been made to determine the influence of the resinous constituents. In 1912 Beadle and Stevens showed that the removal of the greater part of the resins by acetone extraction retarded the cure, impaired the tensile properties and increased the perishability of the vulcanized product. L. E. Weber corroborated these statements and even expressed the belief that "the resins play an active part in the vulcanization, and not merely as a catalyzer, their presence being absolutely essential," in fact that the compound prepared from resin-extracted rubber "could not be vulcanized," this latter statement being based upon the poor tensile properties of the rubber.

In the present pamphlet, however, Dr. Stevens maintains that rubber may possess poor tensile properties and yet be vulcanized to some extent or even over-vulcanized. He refers to his own investigations to the effect that the degree of vulcanization is largely dependent upon the relative proportions of rubber, sulphur and litharge in the compound, and points out that the highly specialized type of compound containing litharge which Weber employed appears to be hardly suited to the purpose of ascertaining the specific vulcanizing properties of any particular rubber sample. The fact that an essential criterion of a properly cured rubber is its aging quality was also emphasized, any conclusion based upon the coefficient of vulcanization or upon physical tests with the freshly vulcanized specimen without taking the aging quality into consideration being inaccurate. Then follows a detailed account with considerable tabular matter descriptive of an exhaustive series of tests pointing to the following conclusions:

Certain types of litharge compounds cannot be sufficiently vulcanized to bring out their full tensile properties and coefficient of vulcanization without over-curing and consequent deterioration or "perishing" with age. The removal of resinous matter by acetone extraction retards vulcanization, as indicated by the tensile properties and coefficient of vulcanization, particularly with compounds containing litharge. It also reduces the "stability" of the vulcanized compound, the effects of over-curing being more marked than with untreated rubber. Throughout the tests it was noticeable that plantation smoked sheet rubber vulcanized faster than the air dried (pale) sheet, although in other respects both behaved similarly.

EXPORTING TO LATIN AMERICA. BY ERNST B. FILSINGER. D. Appleton & Co., New York City. [Large 8vo, 565 pages. Price $3.]

To the importer—whether of rubber or of any other commodity—and more particularly to the exporter, this book is indispensable. It contains a vast fund of varied information essential in making a success of exporting to our neighbor republics to the southward. Written by a business man for business men, it dispenses facts rather than theories, and provides an intimate first-hand knowledge of the economic, social and commercial situation of each South and Central American country that will enable manufacturers in the United States to deal directly with their prospective customers. The resources, industries, needs and purchasing power of each are detailed; the business methods and characteristics of the Latin people are described, and former European export methods which have pleased them are discussed. Considerable space is devoted to tariffs, custom house regulations, packing, shipping routes and facilities, local agents and publicity, while the appendix constitutes in compact form a comprehensive encyclopedia of statistical and descriptive information, including an extensive bibliography of magazines, dictionaries, grammars and books devoted to travel and the principal industries. Intelligent classification and indexing makes any needed item available at a moment's notice.

Our readers will find this book of especial interest because rubber and rubber goods are so frequently mentioned. The author points out that although much of the crude rubber of the world comes from Brazil and Peru, manufactured articles of which rubber forms the basis are not produced in either country. As a consequence a splendid market exists for nearly every line of rubber goods in demand in the United States, particularly rubber footwear, raincoats and other waterproof clothing adapted to the climate, druggists' sundries, rubber and woven hose, tubing, sheeting and blankets, erasers, mats, life preservers, etc.

Manufactures are growing rapidly in South America and natural resources are being developed so that much rubber belting and insulated wire are being used. The adoption of the motor car in large cities for pleasure driving, parcel delivery and even freight handling, together with the increased building of improved country roads, are ever demanding more rubber tires. Games and sports are being introduced which insure an increasing need of tennis and golf balls, rubber-soled shoes and the like. Indeed, the rubber manufacturer, in whatever line, will find a considerable outlet for his product if he will but study this market and approach it in the right way. Until the war, Germany held a virtual monopoly of South American trade, chiefly because she made it a point to give these merchants what they wanted, carefully packed so as to arrive in perfect condition, prepaid to its destination and piloted through the custom

house by local agents so that the customer was freed of all annoyance. Our Latin neighbors are now of necessity turning to us, and it remains to be seen if we shall do as well. Such writers as Mr. Filsinger have pointed out the way, but the volume of trade we retain after peace is declared will be the measure of our success.

PARA RUBBER PLANTING IN MALAYA. BY PIERRE DE BONDY, Ipoh, Perak, F.M.S. The Times of Malaya Press, Limited. [8vo, 84 pages, paper. Price $1.]

This volume consists of an estimate for opening 2,000 acres in five years together with an itemized statement of the total expenditure up to the seventeenth year inclusive, showing cost of rubber production and the profits based on rubber at 1*s.* 6*d.* per pound. According to the author's statement, capital will be required up to the seventh year to the extent of $537,329, or $268 per acre. The yield will begin the eighth year and net profits the tenth year ($1402), and in increasing ratio thereafter until $553,150, or 102 per cent is reached in the seventeenth year, the total profits up to that time being $3,103,473, or 577 per cent. From the itemized yearly statements one gets an intimate knowledge of the various overhead and other expenses incident to rubber growing, the prevailing rates of payment, etc.

THE MOTORIST'S HANDBOOK ON VULCANIZING AND THE CARE of Tires. Harvey Frost & Co., Limited, London, England. [8vo, 56 pages, boards. Price, 1*s.*]

This concise yet comprehensive handbook deals with tire vulcanizing from the standpoint of the private motorist, particular attention being given to the care of tires which will reduce the necessity for vulcanizing to the minimum. The best treatments for punctures, nips, bursts and blow-outs in tubes are described minutely and well illustrated; also joining tubes, reseating valves and vulcanizing the seating. Casing repairs are gone into at considerable length, including the filling of cuts and vulcanizing of square tread covers, grooved covers, and studded covers. The treatment of loose treads and blisters is described and canvas defects and reinforcements are taken up in detail. Methods of patching with the aid of a steam mandrel are reviewed, also reversing the cover and replacing damaged canvas with new material. Vulcanization and inflation tables are given, together with description and prices of the leading British portable vulcanizers, mandrels and repair materials.

NEW TRADE PUBLICATIONS.

Any of the following publications will be supplied by those issuing them upon request.

ARTHUR JACKSON WILLS, North Brookfield, Massachusetts, manufacturer of special machinery for rubber work, sends a very attractive six-page folder descriptive of his specialties, such as overflow trimmer; carton erecting, filling and closing equipment; rubber edging plaiter, etc.

* * *

The Barber Asphalt Paving Co., Philadelphia, Pennsylvania, has recently published "The Good Roof Guide Book," which will be of interest to the many manufacturers of rubber goods now engaged in enlarging their plants. "Genasco Ready Roofing," with its layers of Trinidad lake asphalt between layers of burlap, wool felt and a surface of crushed quartz, possesses qualities of special value for use on factories, warehouses and storage sheds, which are convincingly described in this handsome pamphlet.

* * *

"The Circle" is the name of a bright and attractive monthly magazine published for and by the employes of The B. F. Goodrich Co., Akron, Ohio. Two concentric circles have been worked into the design on the title-page, the words "Employer—Public—Employe" occupying the space between them. This and the contents of the publication indicate clearly that the intention is to create a closer bond of friendship, better firm spirit and team work. The news of the entire Goodrich organization, with numerous illustrations, forms the principal feature, although considerable attention is given to the problems of home life, athletics, and new books in the Goodrich library, not forgetting a goodly amount of brightening humor. The general program embraces fiction, biography, history, mechanics, economics and recreation, and every employe is encouraged to make helpful suggestions.

* * *

The live-wire publicity man of the American Chicle Co., New York City, is issuing at frequent intervals a large, illustrated news sheet called "Chicle-Chat." The Harvest Edition, September and October numbers combined, has the breezy character of energetic salesmanship and will interest everybody who sells chewing-gum. In addition to the general news of the trade and many personal items, nearly a page has been devoted to the interesting story of chewing-gum manufacture, from its origin as the milky juice of the Zapote tree, found chiefly in Mexico, to the finished product.

UNIQUE "M. R. X." ADVERTISING.

The Standard Emarex Co., New York City, manufacturer of the hydrocarbon filler "M. R. X.," is distributing a unique advertising novelty. It consists of a rubber inkwell taking the form of a conical pile of tires of diminishing size surmounted by a stopper bearing a ball handle, the idea being to show the character of black rubber containing this well-known filler.

RUBBER TRADE INQUIRIES.

THE inquiries that follow have already been answered; nevertheless they are of interest, not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The editor is therefore glad to have those interested communicate with him.

[237.] A correspondent requests names of rubberizing houses.

[238.] Information is sought concerning machinery for milling sheet rubber to uniform thickness.

[239.] Names of manufacturers of rubber sheeting for hospital use are requested.

[240.] An inquirer wishes to know how to compute the size of a casing and that of the corresponding tube.

[241.] Information is sought regarding the character and extent of purchases of manufactured goods, particularly farm implements and machinery, that an average rubber plantation would be likely to make.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS.

An automobile garage proprietor in Venezuela desires the agency for American tires. Report No. 22,795.

Quotations are desired by a firm in Spain on medical and surgical rubber goods, rubber overshoes and raincoats, rubber heels, suspenders and fountain pens. Report No. 22,854.

A firm in Russia wishes to communicate with American manufacturers of garters. Report No. 22,874.

Representation of an American manufacturer of raincoats is sought by a merchant in Spain. Report No. 22,879.

Commercial relations are desired by a business house in Portugal with American manufacturers of rubber thread and thin rubber used in the manufacture of suspenders, garters, etc. Report No. 22,922.

A wholesale druggist in Spain wishes to import rubber articles. Report No. 22,975.

An import house in New Zealand desires to enter into commercial relations with American manufacturers and exporters of garden hose and rubber goods for household use. Report No. 23,044.

Interesting Letters from Our Readers.

FUTURE SUPPLY AND DEMAND IN CRUDE RUBBER.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—The probable course of the rubber market after the war is becoming a source of diverse opinion among the trade. Until peace has been declared, the market will be extremely sensitive, but what of supply and demand after that?

Of course the former German and Austrian consumption of about 20,000 tons annually is offset by the needs of the American automobile tire industry, that has absorbed most of the increased output of crude rubber. The outcome of a return to normal conditions, however, will depend upon this production as compared with the logical increase of the world's consumption. Replenishing the exhausted supply of the Teutonic nations will cause only a temporary flurry. Cheap synthetic rubber does not promise to become a factor, although German chemists have been spurred to great efforts in this direction.

In an attempt to forecast future production and consumption several significant facts have been presented in Rickinson's monthly review of "The World's Rubber Position," and in "The Financial Times," London.

Regarding production, it is stated that the output of wild rubber from Brazil and elsewhere has been practically the same for several years and probably will remain so, but that the development of rubber plantations increased the world's output 31.8 per cent in 1915, while the increase for 1916 is estimated at 27.3 per cent. As no considerable areas have been planted since 1911, however, the belief is expressed that this rate of increase is not likely to be maintained. Although 214,000 acres were brought into bearing in 1911, it is pointed out that the total increase between now and 1920 will probably not exceed 377,000 acres, so that any greatly expanded output must be the result of increased production per acre. The average yield, I understand, is now 336 pounds per acre, and in 1920 it may have reached 400 to 450 pounds. This would insure a world's output of 300,000 to 330,000 tons, provided the wild rubber supply remains constant.

To forecast consumption appears to be far more difficult. During the past six years the average increase in the United States has been 24 per cent. Were that rate maintained there would be a serious rubber shortage in 1920; indeed, an increase in the world's demand of 20 per cent per annum would require 373,000 tons in 1920. While such a continued increase seems improbable, there is every indication that the growth of the motor car industry, the use of rubber for new purposes and the certain requirements of Europe after the war may render the expected increase from plantations during the next five years none too great to meet the world's requirements.

ANOTHER VIEW.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—We believe it fair to assume that as the present plantation trees age, the girth being larger, the output of latex will increase in proportion, but when this yearly increased production ceases to be an important factor, we are not prepared to say, and, therefore, will not calculate any increase beyond 16 years of age, considering the output after this period at maximum. Therefore the following is based upon:

1st—Tree will reach its maximum output at 16 years of age.

2nd—No planting after 1915, other than enough to take care of such as may die, or be destroyed. The acreage January 1, 1916, being 1,377,000.

3rd—A fair average increased production yearly from the fourth year to the 16th, after which the output remains the same.

On this basis of calculation we secure the following production for the years indicated:

PLANTATION RUBBER.

Production.	Estimated.	Reported.	Under Estimated.	Over Estimated.
1900.....tons	.....	4	.....	.....
1901.....	.....	5	.....	.....
1902.....	.....	8	.....	.....
1903.....	.....	21	.....	.....
1904.....	.....	43	.....	.....
1905.....	.....	145	.....	.....
1906.....	.....	510	.....	.....
1907.....	.....	1,000	.....	.....
1908.....	.....	1,800	.....	.....
1909.....	4,950	3,600	1,350	.....
1910.....	10,302	8,200	2,102	.....
1911.....	21,350	14,419	6,931	.....
1912.....	33,510	28,518	4,922	.....
1913.....	48,574	47,618	956	.....
1914.....	70,182	71,380	.....	1,198
1915.....	100,536	107,767	.....	7,332
1916.....	132,962	150,000	.....	17,038
1917.....	167,085	.....	.....	.....
1918.....	203,252	.....	.....	.....
1919.....	242,081	.....	.....	.....
1920.....	281,330	.....	.....	.....
1921.....	320,562	.....	.....	.....
1922.....	361,075	.....	.....	.....
1923.....	397,321	.....	.....	.....
1924.....	423,723	.....	.....	.....
1925.....	446,496	.....	.....	.....
1926.....	469,233	.....	.....	.....
1927.....	483,039	.....	.....	.....
1928.....	494,356	.....	.....	.....
1929.....	503,261	.....	.....	.....
1930.....	508,794	.....	.....	.....
1931.....	510,311	.....	.....	.....

The yearly increase progresses proportionately, but with a lessened percentage of increase each year up to 1931, when all trees planted prior to January 1 last, would reach their sixteenth year of maturity, and during which year the output would be 510,311 tons, after which the production would remain the same.

According to these figures there is ample crude gum in sight, and the riddle of the future appears to be on the consumer's side more than on the side of the producer, as it is hardly possible that the acreage under cultivation will not be increased beyond what it is at this time, to say nothing whatever about the increased latex from the trees as they reach a period beyond 16 years of age. In the above we have not included any wild rubbers, covering the plantation product only.

A LARGE RUBBER FIRM'S OPTIMISTIC OPINION.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—So many industries are face to face with constantly decreasing supplies of raw material and ever increasing demands that the contrast afforded by the rubber business looms up vividly.

In 1905 uncultivated or "native" rubber comprised 60,800 tons, while in 1914 the production had dropped to 60,000 tons. But during the same period plantation rubber had risen from 145 to 64,000 tons. From the best available figures we estimate that while native rubber production will have fallen to 34,500 tons in 1917, plantation rubber will have reached 147,000 tons. By 1921 probably 209,000 tons of cultivated rubber will be available, while the supply of native rubber will have dropped to 30,000 tons.

When crude rubber reaches that level of cost which vastly increased supplies would indicate, myriad new uses will be added to those for which the present relatively limited production is

required. As ranches and open ranges become converted into farms, and the number of cattle decreases, lessening the supply of leather, while the population which must wear shoes and the factories which must have belting increase, rubber will step in more and more to furnish better service at even lower cost.

THE LARGEST HEVEA?

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—Passing through Shanghai last week, on the way home from the East Indies, a subscriber in the Chinese port lent me the September INDIA RUBBER WORLD, just received, in which there was, on page 652, the account and illustration of the largest *Ficus elastica* tree.

GIANT *Hevea Brasiliensis* IN CEYLON, GIRTH 10 FEET 4 INCHES.

Your readers may be interested to see a reproduction of the enclosed photograph that a friend took in Ceylon recently. I thought it was the biggest specimen of *Hevea Brasiliensis* in the Orient, but a fellow passenger on board, Director Edgar B. Davis, of the General Rubber Co., tells me there is one still greater at Mergui, Burma, 160 inches in circumference. This is about the size of the Rambong (*Ficus elastica*) that visitors are shown growing in the Plaza in front of the old cathedral in the Walled City, Intramuros, Manila.

The native caretaker, standing on the right of the picture, informed me that the Ceylon giant produced nearly 400 pounds of dry rubber in the five years ending with 1914, when tapping was stopped. The numerous seeds, however, are distributed abroad to planters who apply for them, and it is undoubtedly the parent and grandparent of some extensive estates. The photograph was made by William B. Daniel, nephew of C. A. Daniel, president of the Quaker City Rubber Co., Philadelphia, Pennsylvania. RICHARD WEIL.

On board R. M. S. "Empress of Asia," October 14, 1916.

AN AMERICAN OPPORTUNITY IN RUSSIAN FOOTWEAR SCRAP.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—No doubt you are aware of the fact that Russia is the greatest country for rubber shoes, and for that reason has been supplying more old shoes than any other nation. Until the war Germany and England were the biggest buyers of old rubber shoes, while the United States got only a trifling quantity that Russia exported.

Since the war broke out an embargo has been placed by the Russian government on all rubber products, and also on old rubber shoes, which resulted in a very big accumulation of the latter in that country. We think, therefore, that now would be the right time for an American concern to buy up as much as possible of this stock, and have it stored away in Russia until after the war. The cost of storage would be insignificant in comparison to the gain in rate of exchange, the Russian ruble now being between 29 and 30 cents, whereas in normal times it was 51½ cents. RUSSIAN-AMERICAN AGENCY OF COMMERCE.

New York City, November 21, 1916.

JUDICIAL DECISION.

COHEN V. FIDLER & CO., ENGLAND. This suit to restrain infringement of the trade-mark "Regent" hinged upon whether its use upon waterproof garments known as "yarnproof" anticipated the subsequent use of the mark by another party upon rubberproof garments, the defendant maintaining that, as he had been the first to use the mark upon rubberproof goods, the plaintiff's prior use of it upon "yarnproof" goods would not enable the plaintiff to enjoin his continued use of the mark. It was held by the court that the goods were of the same descriptive properties, and that inasmuch as the defendant's adoption of the mark was with knowledge of the plaintiff's use and rights, he was not entitled to register his mark under the provisions of the trade-mark act, which permits the registration of an identical mark for more than one party, where there has been honest, concurrent use. [United States Trade-Mark Association Bulletin, October, 1916, page 263.]

DE LASKI & THROPP PATENT NO. 1,011,450 VALID.

In our November, 1916, issue, under Judicial Decisions, the De Laski & Thropp patent No. 1,011,450 for a tire wrapping machine was published as void. This was an unfortunate error in the records, which we are pleased to correct. The patent actually involved was No. 822,561, relating to a mold for vulcanizing tires.

GRANULATED CHICLE DUTIABLE AT 20 PER CENT.

The protest of G. W. Sheldon & Co., New York, claiming duty at 15 per cent ad valorem as "crude chicle," was recently overruled. The Board of General Appraisers held that chicle, imported in a granulated form, from which the moisture has been extracted, is advanced in value and is properly classifiable under paragraph 36, tariff act of 1913. This reads: "Chicle, crude, 15 cents per pound; refined or advanced in value by drying, straining, or any other process or treatment whatever beyond that essential to the proper packing, 20 cents per pound."

ASBESTOS IN ARIZONA.

Up to the present time Canada was the only locality in America where long fibered asbestos was obtained. While Wyoming produces asbestos, this material is of the serpentine type and is short fibered. Lately large deposits of the long fibered type of asbestos were discovered in Arizona, the largest deposits being in the Sierra Ancha and at Ash Creek. The asbestos of Arizona is chrysotile asbestos and is found in lime and diabase. Its nature makes it especially useful for the manufacture of fabrics. The high-grade material is at least 50 per cent of the total asbestos mined and is the only grade that is being shipped, due to the high freight. [Metallurgical & Chemical Journal.]

The Canfield Rubber Co. of Bridgeport, Connecticut, was granted a drawback allowance early last month on the exportation of dress shields, infants' specialities, diapers and bibs, with the use of imported galloon binding, Japanese silk, lace trimming, beading, frilled webbing, tape and drawing strings.

The Obituary Record.

THE DEAN OF FIRE HOSE SALESMEN.

ISAAC BELKNAP MARKEY, vice-president of the Eureka Fire Hose Manufacturing Co., Jersey City, New Jersey, died at his residence in Brooklyn, New York, November 7, aged 83 years. Mr. Markey was born in Little Britain, New York, and for the last 45 years was actively connected with the fire hose industry, most of this time with the above-named company. For 25 years he was a traveling salesman, visiting every part of the country, and becoming intimately acquainted with city officials, and fire department chiefs. During his business life he saw many important changes in the fire hose trade, including the evolution from leather hose to copper riveted linen hose, and then to the tubular woven, rubber-lined linen hose of today.

Mr. Markey was a familiar figure at the conventions of the International Association of Fire Engineers, attending every convention of that body since 1873, and the appreciation in which he was held was evidenced by the presentation to him, a few years ago, of a beautiful diamond-studded badge of that association. He was familiarly known as "Uncle Ike" by his many friends and associates. Mr. Markey was a member of several Masonic bodies, a life member of Mecca Temple, a member of the Independent Order of Elks, and of the Machinery Club.

He leaves a widow, two sons and three daughters.

F. S. SILLIMAN.

I. B. MARKEY.

PHILIP BRAENDER.

WELL-KNOWN VETERAN RUBBER SALESMAN.

Francis F. Silliman, for many years a salesman in the rubber business, died at his residence in Malden, Massachusetts, November 14, aged 81 years.

He was born in East Haddam, Connecticut, and on completing his education entered the factory of the Hayward Rubber Co., at Colchester, Connecticut, where he learned the trade of making rubber boots. With several others he went to Malden when E. S. Converse organized the Boston Rubber Shoe Co. In the early sixties he was sent by C. M. Clapp & Co. to Cincinnati to straighten out some trouble over a government contract, and soon after became salesman for that firm, then handling the goods of the National India Rubber Co. at Bristol. He covered New York and New England when Robert D. Evans traveled in the western states. Upon Mr. Evans' retirement from the firm of C. H. Clapp & Co., Mr. Silliman secured an interest, and when the firm went out of business he associated himself with the Cable Rubber Co., retiring from business about five years ago because of old age.

Mr. Silliman was a member of the Malden Common Council for several years, and in 1885 and 1886 was an alderman. He was a member of Mt. Vernon Lodge of Masons and Hugh de Payens Commandery of Knights Templars, a trustee of the Malden Savings Bank, and for many years a member of the First Baptist Church in that city. He is survived by his widow and one son, Edwin B. Silliman, western salesman for the American Rubber Co.

A PROMINENT TIRE MANUFACTURER.

Philip Braender, president of the Braender Rubber & Tire Co., Rutherford, New Jersey, passed away at his home in White Plains, New York, November 4. Mr. Braender was born in Germany in 1849, and at the age of 16 came to America where he entered the real estate and building business in New York City. Some of his best-known buildings are the Braender Apartment House and the Ashland Building, the latter being on the site of the old Ashland House.

While still maintaining his active connection with the prominent New York firm of contractors and builders bearing his name, he entered the rubber business in 1911 in conjunction with the late Frank McGowan under the firm name of Cable Pneumatic Tire Co., and later in 1912 took over this interest under the present name and associated with him the late G. Strauss, formerly with the Goodyear Rubber Co. in the manufacture of bicycle tires.

Mr. Braender was also president of the Braender Building & Construction Co., of New York, a member of the Arion Society of New York and Teutonia Lodge No. 617 A. F. & A. M. He leaves a widow, and four sons connected with the company. His estate of $1,000,000 is divided among the members of his family.

The Rubber Cargo of the "Deutschland"

OUR highly esteemed contemporary "Le Caoutchouc & la Gutta-Percha," under date of September 17, publishes the following:

If we are to believe information coming from the United States, the famous German commercial submersible boat "Deutschland" has left Baltimore with a cargo made up chiefly of rubber.

This exportation of rubber is going to put in a rather peculiar position the Rubber Club of America, of which Mr. Firestone is now president, and which has pledged itself to the British Government—to which now belongs the control of rubber—that none of the rubber imported into the United States will be re-exported to the "Central Empires."

It is under this express condition that Great Britain allows the supplying of the United States with rubber and it is this express condition that has been outrageously violated in the case of the "Deutschland."

It is quite evident that there are in America a sufficient number of pro-German concerns, and even of unscrupulous merchants, who, in the presence of an opportunity for exceptional profit, would not hesitate to violate a solemn pledge and to furnish to the captain of the "Deutschland" all the rubber he could take away. Nevertheless, the responsibility of the Rubber Club is engaged, and we are curious to know what measures the British Government will take concerning it.

Will it (the British Government) stop imports for a few weeks? With a consumption that will exceed 100,000 tons this year, our good Yankees would be slightly famished, but they would learn to know that pledges must be respected.

(D).

While acknowledging the consistent fairness of "La Caoutchouc & la Gutta-Percha," we still feel that there are many circumstances of which they are not cognizant, else the above would not have been written. The Rubber Club of America, Inc., of which Mr. Firestone is the president, has not "pledged itself to the British Government that no rubber imported into the United States would be exported to the Central Empires": first, because no such pledge was ever demanded or exacted by Great Britain; and second, because the Rubber Club was in no position to pledge itself to a demand of that character. The Rubber Club from time to time adopted the practice of explaining to individual rubber manufacturers and importers the terms upon which they could secure the release of rubber from the British Government as laid down by their rules and regulations. As for the rubber that went to Germany on the "Deutschland," it was sold by one who had signed an individual guaranty and thereafter violated its terms, and over whom, manifestly, the Rubber Club should have had no control. The shipment of rubber, as nearly as can be known, amounted to about 100 tons. Actually it was about one-tenth of one per cent of the rubber that had come into the United States since the embargo was lifted and guaranties exacted.

Although our contemporary has not yet mentioned it, it is probable that further feeling will be developed by the second "Deutschland" cargo, now on its way to Germany. This is also a little over 100 tons of rubber, but it is rubber that was bought in the Dutch East Indies, by parties not connected with the American rubber trade, either as importers or manufacturers, and was a transaction which involved no guaranty and for which the American rubber trade or The Rubber Club of America, Inc., are in no way responsible. In other words, American rubber importers and manufacturers individually have lived up to their guaranties with wonderful unity and good faith and we have no doubt that "La Caoutchouc & la Gutta-Percha," now the facts are made apparent, will frankly admit it.

RUBBER CLUB ANNOUNCEMENTS.

IN ADDITION to the prominent speakers that were mentioned in the November issue of THE INDIA RUBBER WORLD, Bishop Frank Du Moulin, Bishop Coadjutor of Ohio, will address the Rubber Club at the annual banquet to be held in New York City January 8 in the grand ball room of the Waldorf-Astoria. Many prominent men of national reputation have been invited to attend, including the President and Vice-President of the United States; the Governor of the State of New York and the Mayor of New York City; the chairman of the Federal Trade Commission and several ministers and ambassadors of European and South American countries.

A new and pleasing tribute to the ladies will be the reservation of the boxes surrounding the ball room for their use after the banquet, when the speeches will be made.

RUBBER CLUB EXECUTIVE COMMITTEE MEETING.

The executive committee of The Rubber Club of America, Inc., held a meeting November 20, at the Whitehall Club, 17 Battery Place, New York City. Messrs. Firestone, Hodgman, Cartwell, Bruyn and Pearson were present. The usual routine business was transacted, two firm members dropped for non-payment of dues and the resignation of F. G. Burgess, Hodgman Rubber Co., Boston, Massachusetts, was accepted. The following firm and associate members were elected:

FIRM MEMBERS.

New York Insulated Wire Co., New York City.
Representative, L. O. Brewster.
Mitsui & Co., Ltd., New York City.
Representative, Tamotsu Nagano or Sadatka Tishima.
The Goodyear Rubber Insulating Co., New York City.
Representative, H. C. Green.
W. H. Whittaker & Co., New York City.
Representative, Samuel H. Clark.
J. Spencer Turner Co., New York City.
Representative, John E. Rousmaniere.
The Whitney Blahr Co., New Haven, Connecticut.
Representative, M. E. Chester.
Victor Balata and Textile Belting Co., Brooklyn, New York.
Representative Charles E. Aaron.

ASSOCIATE MEMBERS.

United States Rubber Co., New York City.
Representative, Ralph W. Ashcroft.

THE SPRECKLES RUBBER PLANTATION.

John D. Spreckles, of sugar fame, is also president of the Savage Tire Corporation, San Diego, California. As tropical plantations are no new venture to him, he has lately acquired large rubber plantations in Java—another bit of American forehandedness.

The North British Rubber Co., Limited, Castle Mills, Edinburgh, Scotland, informs us through its Canadian branch that a man giving the name of Mr. McKenzie is falsely representing himself as being in the employ of the company. The coöperation of the trade is requested in arresting this man, and any information that would assist in locating him should be addressed to The North British Rubber Co., Limited, 43 Colborne street, Toronto, Canada.

News of the American Rubber Trade.

PENNSYLVANIA RUBBER CO. APPOINTS SALES DIRECTORS.

GENERAL Manager Lewis of the Pennsylvania Rubber Co., Jeannette, Pennsylvania, announces that in order to give more personal attention to the business in various sections of the country it has been decided to establish districts, each under a sales director. The following appointments have been made: G. C. McCullough, eastern territory; D. D. F. Yard, southern district, James Q. Goudie, central states; C. F. Kent, the West; James F. Madden, Pacific Coast. Vice-president Charles M. DuPuy, who established the branches in both Pittsburgh and Philadelphia, will, as heretofore, take personal charge of the Pennsylvania district.

BUILDING ACTIVITIES OF BUFFALO FOUNDRY & MACHINE CO.

The Buffalo Foundry & Machine Co., Buffalo, New York, is in a continuous state of expansion. A new steel shelf shop, 34 by 110 feet, recently completed, will contain, exclusively, steel shelves for the company's vacuum dryers. This building is of structural steel with steel sash and asbestos-covered corrugated steel and in connection with it a Kuhn steel storage shed, 28 by 58 feet, is also being erected.

Bids are being received for a new testing laboratory, 75 by 90 feet, of brick and concrete, which will contain a chemical and physical laboratory for the chemist of the foundry and the chemist and testing engineer employed in connection with the vacuum drying business of the company.

A brick and concrete addition to the present pattern storage building is also planned, which will double the capacity of this storage.

NEW JERSEY CAR SPRING & RUBBER CO. APPOINTMENTS.

The New Jersey Car Spring & Rubber Co., Jersey City, New Jersey, announces that, following the resignation of S. P. Woodward from his position as general and sales manager, J. W. Paul will act as sales manager of mechanical goods and L. K. Rittenhouse as sales manager of the tire department. Mr. Paul has been associated with the company for some time past as assistant sales manager, having formerly been manager of the Pittsburgh (Pennsylvania) branch of the Diamond Rubber Co. Mr. Rittenhouse was recently connected with the Norwalk Tire & Rubber Co., previous to which he was, for about ten years, associated with the interests of the Diamond and Goodrich companies as district manager at Boston, Massachusetts, and St. Louis, Missouri.

MAGMETCO CRIMSON AND GOLDEN ANTIMONY.

The Magnolia Metal Co., 115 Bank street, New York City, manufacturer of the well-known Magnolia babbitt metal, is now manufacturing both crimson and golden sulphuret of antimony for the rubber trade. These products are known as Magmetco brand, 15/17 per cent, and have no free sulphur. The St. George Chemical Co., 99 John street, New York City, is sole selling agent for the United States and Canada.

The Barrett Co., 17 Battery place, New York City, is manufacturing a high grade solvent naphtha suitable for the rubber trade. It is a coal tar distillate of exceptional solvent power. Color, water white; distillation, approximately 5 per cent at 130 degrees C. and 90 per cent at 160 degrees C. The evaporation is slightly faster than turpentine and the flash point about 78 degrees F.

The F. S. Carr Rubber Co. of Canada, Limited, manufacturer of "Victor" rubber heels, mechanical rubber goods and automobile fabrics, has disposed of its business to the Miner Rubber Co., Limited, Granby, Quebec, which will continue to manufacture the same lines of goods, including its own.

THE RAYBESTOS CO.

The Raybestos Co. has been incorporated under the state laws of Connecticut for $1,500,000 and will take over the Royal Equipment Co., manufacturer and distributer of Raybestos brake lining, brakes, compressed asbestos sheet packing, etc.

A 15-acre factory site has been purchased along the railroad at Bridgeport, Connecticut, and new buildings will be erected which will double the capacity of the present plant. The single-unit type of construction will be used throughout all the buildings, and plans and specifications have been finished for the following additions: Two buildings of concrete and steel, each 100 by 600 feet, to be used for the weaving of brake lining; one building, 100 by 200 feet, for the manufacture of brakes; one, 60 by 200 feet, for the treating of Raybestos; one, 60 by 300 feet, for manufacturing compressed sheet, and one, 60 by 300 feet, for the storehouse and shipping department. A power house and office building will also be erected.

The yearly production of Raybestos brake lining is now 15,000,000 feet, and of compressed asbestos sheet packing, 1,000,000 pounds.

SAFETY FIRST FACTORY SIGNS.

"Safety First" has become a slogan of great significance in all manufacturing plants. The management of the Republic Rubber Co., Youngstown, Ohio, believes in warning workmen to be careful. Signs are placed in various parts of the plant adjuring the employes to use care and caution. Fire boxes are distributed at many points through the premises, and signs are placed pointing the way to the nearest one. A significant sign tells the possible effects of a fire, others placed on stairs admonish employes to go slowly to prevent crushes, while still others illustrate the effective way in which an effort is being made to instil in the minds of the workmen the advantages of care and caution for health, safety and prosperity.

RUBBER COMPANY DIVIDENDS.

The Federal Rubber Co. paid the regular dividend of $1.75 per share on second preferred stock on November 25.

The directors of the Plymouth Rubber Co. have declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable December 1.

The Ajax Rubber Co., Inc., has declared a quarterly dividend of $1.25 per share, payable December 15 to stockholders of record November 29.

RUBBER COMPANY SHARE QUOTATIONS.

The following market quotations of shares of rubber manufacturing companies on November 25, are furnished by John Burnham & Co., 115 Broadway, New York City, and 41 South La Salle street, Chicago, Illinois:

	Bid.	Asked.
Ajax Rubber Co. (new)	70	72
Firestone Tire & Rubber Co. (new), common	168	171
Firestone Tire & Rubber Co., preferred	106	108
The B. F. Goodrich Co., common	70½	71
The B. F. Goodrich Co., preferred	120	123
Goodyear Tire & Rubber Co., common	294	297
Goodyear Tire & Rubber Co., preferred	108½	109½
Kelly-Springfield Tire Co., common	76¼	77¾
Kelly-Springfield Tire Co., 1st preferred	96	99½
Miller Rubber Co., common	255	260
Miller Rubber Co., preferred	107	108
Portage Rubber Co.	165	170
Rubber Goods Mfg. Co., preferred	..	..
Swinehart Tire & Rubber Co.	85	89
U. S. Rubber Co., common	65¾	66¼
U. S. Rubber Co., preferred	112¼	113

TRADE NOTES.

The business of G. E. Thing & Co., Buffalo, New York, has been acquired by the United States Rubber Co., of New York City, and will be continued as a branch store of that company, under the same name as formerly, with J. F. Barnes as manager.

The Orrville Rubber Co., Orrville, Ohio, notice of whose incorporation appeared in the November issue of THE INDIA RUBBER WORLD, has begun operations with newly purchased machinery that will insure an output of 360 tires per day. The company will manufacture inner tubes and tires, specializing in Ford sizes, and about January 1 will commence to manufacture heels, soles and rubber matting.

The Panama Rubber & Equipment Co., St. Louis, Missouri, has increased its capital stock to $30,000. This company has recently added to its automobile business a lighting and starting battery station, managed by H. E. Spoeneman, who has become a member of the firm.

Rosenwald & Weil, Chicago, Illinois, have more than doubled their rubberizing capacity within the past year and have recently contracted to produce 1,000,000 yards of auto-top combining work. This concern is now running a new 66-inch, three-roll Farrel calender, and in order to secure the proper control over the variable speeds, a transformer and rotary converter has been installed in connection with a Cutler-Hammer control board.

This firm recently held an extensive exhibit at their sample rooms for the information of raincoat buyers. Crude rubbers of various kinds were shown, together with bottles or jars of compounding ingredients, each properly labeled. With these were displayed samples of the fabrics before and after sheeting, all appropriately labeled. The exhibit elicited much favorable comment from the buyers.

The entire plant of the Atlantic Manufacturing Co., mechanical rubber goods, at Wilmington, Delaware, was consumed by fire on November 7. It is said that the plant will at once be rebuilt.

The Barrett Co., Philadelphia, Pennsylvania, a large manufacturer of chemicals and compounding ingredients used in the rubber trade, specializing in benzol, will build a one-story brick and concrete boiler plant on Bermuda street.

The United States Rubber Co. of California, will occupy a new $10,000 building now in course of construction at 731 Broadway, Tacoma, Washington. The new quarters will be 40 by 100 feet, three stories high.

The New York City offices of Werner & Pfleiderer Co., of Saginaw, Michigan, are now located on the thirty-seventh floor of the Woolworth Building.

The capital stock of the Portland Rubber Mills, of Portland, Oregon, has been increased from $25,000 to $40,000, according to an announcement made by H. C. Huntington, president and general manager of the mills. The company specializes in molded goods.

It is reported that Robert H. Childs, superintendent of the Asphalt & Rubber Co., Independence, Kansas, has resigned and will be succeeded by J. H. Harre, of Chicago, Illinois.

The recent annual meeting of the Electric Hose & Rubber Co., Wilmington, Delaware, showed a gross business of $1,468,000, as compared with $991,000 during the preceding year. Total dividends for the year amounted to 15 per cent.

The new mechanical rubber goods manufacturing company located at Goshen, Indiana, will be known as The Goshen Rubber & Manufacturing Co. The new company was incorporated with a capital of $55,000 and its officers are Charles Noel, president, general manager and treasurer, and Henry W. Pease, secretary, sales manager and superintendent.

Large additions are being made to the La Crosse Rubber Mills, La Crosse, Wisconsin. Present plans embrace a largely increased force and output of rubber boots and shoes.

The Meade Rubber Co., Stoughton, Massachusetts, manufacturer of molded specialties, is working its factory day and night and is unable to keep abreast of orders.

The United States Rubber Co., Lycoming, Pennsylvania, will erect a four-story addition to its plant costing $40,000. The completion of this will allow for an increase in force of 500 to 1,200 persons, and in production to 20,000 pairs of shoes daily.

PERSONAL MENTION.

The whole trade will hear with much regret of the accident that happened to Robert B. Baird, vice-president of the Rubber Trading Co., on the 14th of November. Mr. Baird, in crossing lower Broadway, New York City, was struck by a car and badly crushed under the fender. He was taken to the Seeney Hospital in Brooklyn, where he has remained in an unconscious condition most of the time since. His injuries seem to be shock and a slight concussion of the brain. The physicians in attendance report that his condition is very serious.

Marcus Rothschild, who has been connected with the Rubber Trading Co., New York City, since its organization, has commenced business on his own account as a crude rubber broker, with offices at 23 Beaver street, New York City.

Captain Ernest E. Buckleton, president of the Northwestern Rubber Co., Litherland, Liverpool, England, has recently been visiting his many friends in the United States and Canada. Captain Buckleton is hale, hearty and optimistic as usual, and if he returns to England early in December, as he now plans, the American rubber trade heartily wishes him *bon voyage*.

Frederick C. Peck, author of "The Valuation of Rubber Estates" and "Malayan Dollar Companies," and late director of The Mergui Rubber Estates, Limited, Lower Burma, passed through New York last month *en route* to England. He reports a very bright future for the Eastern planting industry.

Edgar B. Davis and H. Stuart Hotchkiss have returned from Sumatra, where they inspected the plantations of the General Rubber Co., of New York City.

J. M. S. Carroll, manager Quebec division Canadian Consolidated Rubber Co., Limited, has been elected by acclamation a director on the board of management of the Dominion Commercial Travellers' Association, to hold office for the years 1917-1918.

W. F. Bowers, founder of the Bowers Rubber Works, San Francisco, California, was a recent visitor at the offices of THE INDIA RUBBER WORLD in New York City. His interests, by the way, in the very successful company that he built up, he sold to his partner, W. R. Johnson.

Leon A. Mainetty has brought suit against George Philips Neider, a New York export merchant, alleging that Neider caused his name to be placed on the British blacklist by inducing him to ship contraband rubber in coffee bags.

"TAPERED" RUBBER WASHERS.

A rubber washer is a simple thing, usually a piece of sheet rubber cut to the shape and size intended. It performs its work well under ordinary circumstances. But if the seat against which it rests be worn or uneven, the washer must be subjected to unusual grinding pressure to secure the necessary tightness, and its early destruction results. A washer that will be fully as effective where the connections are perfect, and much more so where the above-named defects are manifest, has a somewhat spherical surface on one side—a sort of rounded taper. This shape allows the taper to fit uneven surfaces more closely. These washers are made of a flexible compound that renders them more durable and efficient. [The Durst Manufacturing Co., Inc., New York City.]

F. E. PARTRIDGE HEADS NEW RUBBER FIRM IN CANADA.

F. E. PARTRIDGE, president of the recently established rubber manufacturing corporation bearing his name, has been identified with the rubber industry for over 20 years. He started in 1894 with the Maynard Rubber Co., Claremont, New Hampshire, and rose step by step to the position of superintendent. From there he went to the Boston Woven Hose and Rubber Co., Cambridge, Massachusetts, as night superintendent. His next step was to the superintendency of the plant of the Combination Rubber Co., Bloomfield, New Jersey. Later he was called to the Canadian Rubber Co., Montreal, Canada, where he was made vice-president, and given the management of the production of all goods made by that company, with the exception of footwear.

F. E. PARTRIDGE.

Early in 1915 Mr. Partridge formed a partnership with Vincent Cooke for the purpose of manufacturing druggists' sundries and inner tubes, and worked up business to such an extent as to demand a much larger plant. At the opportune moment, the Independent Rubber Co., Merritton, Ontario, Canada, discontinued business, and the plant, valued at $175,000, was leased by the F. E. Partridge Rubber Co. for a term of years, with an option to purchase on advantageous terms.

A new company was formed, with headquarters at Guelph, Ontario, Canada, under the above corporate name, with a capital of $125,000. Mr. Partridge is president and general manager. Associated with him are Vincent Cooke, vice-president, and F. M. Ker, secretary and treasurer. The factory is now turning out tires and tubes, hot water bottles, and a varied line of druggists' sundries, while alterations are being made and extra equipment installed to enlarge further the variety and quantity of the output.

BERGOUGNAN TIRE CORPORATION.

After December 11, 1916, the Gaulois Tire Corporation, 49 West Sixty-fourth street, New York City, American sales agents for Établissements Bergougnan, Clermont-Ferrand, France, will change its name to Bergougnan Tire Corporation. J. Grenier will continue as vice-president and general manager.

NEW CANADIAN TIRE COMPANY.

The Sterns Tire & Tube Co. of Canada, Limited, has been formed with an authorized capital of $1,000,000, and will locate at Windsor, Ontario, with a one-story factory, 100 by 150 feet. The officers of the company include N. J. Morrissey, Pickering, Ontario, president; Edward Sterns, St. Louis, Missouri, director and consulting engineer; C. J. Gibson and A. S. Chapin, Toronto, directors; E. M. Carruthers, Toronto, secretary and treasurer.

PERSONAL MENTION.

Carl P. Cartmell will handle the sales of Kelly-Springfield tires in the Buffalo (New York) territory for the Kelly-Springfield Tire Co., New York City. Mr. Cartmell was formerly treasurer and purchasing agent for the Victor Rubber Co., Springfield, Ohio, but has disposed of his interest in that company.

A. L. Edwards, son of George D. Edwards, notice of whose death appeared in the November issue of THE INDIA RUBBER WORLD, has succeeded his late father as manager of the Detroit (Michigan) branch of the Kelly-Springfield Tire Co.

J. P. Carney, for the past 20 years associated with the Portland (Oregon) branch of the Goodyear Tire & Rubber Co., has now joined the forces of the Imperial Belting Co., of Chicago, Illinois, having charge of the Northwest territory of the latter company, with headquarters in Portland.

Horace De Lisser, chairman of the board of directors of the Ajax Rubber Co., New York City, recently went to Cuba for a several weeks' trip combining business and pleasure.

Leland J. Sparks has been appointed manager of the Portland (Oregon) branch of the Firestone Tire & Rubber Co., having formerly been connected with the branch at San Francisco, California.

William L. Burgess has been appointed sales manager of the Sterns Tire & Tube Co., St. Louis, Missouri. For the past two years Mr. Burgess was general sales manager of the Dorris Motor Car Co. and prior to that had charge of the sales of the rim department of the Firestone Tire & Rubber Co.

H. S. Wheeler has succeeded H. T. Richards as manager of the Memphis (Tennessee) depot of the B. F. Goodrich Co.

A. E. Hertzig, manager of the Baltimore branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has been appointed manager of the Washington branch of the company and will take care of the territory in both sections. L. J. Gemmil, who was manager of the Washington branch, will look after all of the government business exclusively.

S. P. Woodard is now president of the Gillette Safety Tire Co., Eau Claire, Wisconsin, and will have offices in New York City.

It was recently announced that Ralph C. Ridge, former superintendent of the Marathon Tire & Rubber Co, Cuyahoga Falls, Ohio, has succeeded C. F. Pickton as superintendent of the Porter Rubber Co., of Salem, Ohio.

Fred E. Boylan has resigned as Detroit manager of the Swinehart Tire & Rubber Co., Akron, Ohio, to become factory representative of the Sewell Cushion Wheel Co., Detroit, Michigan.

EXPANSION OF THE EAST PALESTINE RUBBER CO.

The East Palestine Rubber Co., Pittsburgh, Pennsylvania, with a factory at East Palestine, Ohio, has acquired additional property of about 12 acres, adjoining the present plant and lying directly upon the main line of the Pennsylvania Railroad, with a railroad frontage of 1,800 feet. This land has been purchased for enlargements and additions to be erected in the immediate future. These improvements will be of single unit type, one story, saw tooth, brick, steel and glass construction. The buildings are to be equipped with the latest type of tire and tube making machinery and will quadruple the present manufacturing capacity.

On completion of the first unit, the construction of the company's "Nabob" tire will be changed from the wrapped tread to the full mold type, but the tire will remain a strictly hand-made product. As soon as the necessary special equipment is obtained, the company also intends to manufacture a cord tire.

TRADE NOTES.

The Reliable Tire & Rubber Co. of New England has changed its name to Interstate Rubber Co. and has removed its Boston (Massachusetts) office to 392-394 Newbury street. This change of name was considered advisable by the stockholders because the company distributes more than one brand of automobile tires.

The Armstrong Rubber Co., Inc., having removed its factory to 118-122 Adams street, Newark, has discontinued its corporation in the State of New York and incorporated in the State of New Jersey for the same amount, $200,000. This company manufactures the well-known Armstrong tube equipped with the Kahn automatic valve.

The F. E. Partridge Co., Limited, notice of whose incorporation appears elsewhere in this issue, has taken over the plant and equipment of the Standard Tire & Rubber Co. of Guelph, Ontario, on a five-year lease, with option of purchase at any time before its termination. The head office of the Partridge company has been moved to Guelph and orders taxing the full capacity of the plant have already been secured. The output consists of high-grade tires, tubes, and druggists' sundries.

The Fisk Rubber Co., Chicopee Falls, Massachusetts, has begun the erection of a boiler plant, 125 by 300 feet, which will include, besides the boiler house, a railroad trestle, coal crusher, automatic conveyors and feeders, with other auxiliary apparatus. The first installation will consist of five 760-horse-power boilers. The building will provide steam and hot water for manufacturing purposes throughout the 20 buildings of the company, and the cost of the entire project will be over $200,000.

Charles F. U. Kelly, president of the Kelly-Field Co., the selling corporation for the Lee Tire & Rubber Co., of Conshohocken, Pennsylvania, has sold his entire interests to Harry E. Field, who has been vice-president and treasurer, and who now becomes president of the company. The business will be continued unchanged except that even closer relations with the factory will be established and a considerable addition made to the selling forces to care for the increased production that is planned for the coming year. Mr. Kelly has not yet announced his future plans.

The East Palestine Rubber Co., East Palestine, Ohio, has increased its capital from $500,000 to $1,000,000.

The Connecticut Mills Co. is building a 400-foot, four-story addition to its weaving mill at Danielson, which will make the mill 850 feet in length. A model village is also being erected, and around the mill proper is an exceptionally fine park with extensive lawns, shaded drives and beautiful gardens. The spinning plant of this company is at Taunton, Massachusetts. R. J. Caldwell Co., Inc., 15 Park Row, New York City, is the selling agent.

The Standard Tire & Rubber Manufacturing Co., with offices in Cleveland, Ohio, and factory at Willoughby, Ohio, has completed material additions in floor space and equipment to take care of increased production. About six months ago this company was producing 50 tires a day, but this output has been increased to 200 a day, and the present expansion has been made in order at least to double that capacity.

The Standard Four Tire Co., Keokuk, Iowa, has increased its capital stock from $240,000 to $340,000, $300,000 being preferred and $40,000 common stock.

The Sheldon Tire Co., Buffalo, New York, notice of whose incorporation appears elsewhere in this issue, was organized to succeed the Quality Tire Co., which is the agency for Hood tires in western New York.

The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, has recently received an order for 70 hydraulic vulcanizing presses of 115-ton rating from the Goodyear Tire & Rubber Co., Akron, Ohio. All of the presses are of one design and will be operated from the hydraulic pump and accumulator systems already installed.

The Crown Tire & Rubber Co., recently incorporated for $250,000, will locate in Omaha, Nebraska, and will specialize in Crown Cord tires for automobiles and motorcycles. Other lines of rubber goods will also be made. The company is said to have acquired five acres of ground for the projected plant, which will comprise six large factory buildings, when completed.

The Luck Tire & Rubber Co. is a new enterprise expected to locate in Hillsdale, Michigan. It is stated that C. J. Davis, of the National Tire & Rubber Co., East Palestine, Ohio, will be manager of the new plant.

In support of their statement that Dann Inserts between the leaves of automobile springs will promote appreciably the life of automobile tires, the Poehlmann Automobile Supply Co., Baltimore, Maryland, offers to add 1,500 miles to the mileage guaranty offered by the tire manufacturer. To obtain the benefit of this arrangement, the automobile owner has only to register with the Poehlmann Co. any new tires which he places on a car equipped with the inserts.

The McGraw Tire & Rubber Co., East Palestine, Ohio, recently turned out 5,324 tires in one day. It is expected that with the installation of certain machinery this figure will soon be greatly exceeded.

Work has been resumed on the Pearce Tire & Rubber Co., Ashtabula, Ohio. It is stated that Cleveland capital has recently become interested in the project.

The Good-Wear Tire Co., which seemed likely to locate in Lorain, Ohio, has decided to operate in Elyria, Ohio, and to that end has purchased a factory in that city.

The Firestone Tire & Rubber Co. contemplates a branch house in Wichita, Kansas.

The Germantown Pennsylvania factory of the Pearce-Arrow Tire & Rubber Manufacturing Co. is turning out a pneumatic tire with a claimed mileage capacity test of 10,000 to 12,000 miles. This company puts out the Pearce "custom-made" 4,200-mile guaranty tire.

The Boone Tire & Rubber Co. will locate at Sycamore, Illinois. The company is expected to be in operation in February.

The V. K. Sturgis factory, at Oakland, California, has taken the operating name of the National Rubber Co. It is said this company will employ 100 men.

The Achilles Rubber & Tire Co., notice of whose incorporation appears elsewhere in this issue, has recently purchased a factory site in Binghamton, New York. The company purposes to manufacture tires.

The Knight Tire & Rubber Co., Canton, Ohio, has been absorbed by the Fabricord Tire Co., which is being formed for the purpose of welding into one great organization several rubber manufacturing units. N. W. McLeod, of St. Louis, Missouri, is president of the Fabricord company, and particular attention will be devoted to the production of cord tires under the McLeod patents. It is said that capitalists of New York, Chicago and St. Louis are interested.

THE BIG FOUR TIRE & RUBBER CO.

The present factory at Berea, Ohio, of the Big Four Tire & Rubber Co., notice of whose incorporation appears elsewhere in this issue, has 18,000 feet of floor space and is situated on a 5½-acre tract of land.

The company is now selecting a site in Cleveland, Ohio, for a new factory, and in the near future will erect there a concrete building 400 feet long by 80 feet wide, three stories and basement. While tires will be the main output, a general line of rubber products will also be manufactured.

KELLY-SPRINGFIELD PLANS FOR CUMBERLAND PLANT.

The future location of the Kelly-Springfield Tire Co., in Cumberland, Maryland, is now an established fact, a site for the new plant having been acquired on a 74-acre tract of land. The factory will be of four-story wing construction, thoroughly modern in every respect, facilities of the most approved sort being provided both as to manufacture and welfare of workers.

A $500,000 bond issue, voted by the city of Cumberland, provides for necessary civic improvements in the section where the plant is to be located. The Kelly-Springfield company in turn agrees to erect a plant costing at least $1,500,000, and within two years after it is in full operation to employ at least 3,000 persons. Within one year after full completion of the Cumberland factory, the Kelly-Springfield company will discontinue all other plants and concentrate its entire manufacturing business in Cumberland.

A CHANGE OF NAME.

At a stockholders' meeting of the Vail Rubber Co., November 2, the name of the corporation was changed to Ehman Tire & Rubber Co. The Ehman company will continue to manufacture and sell pneumatic tires for automobiles and accessories to the tire lines, also mechanical rubber goods. Considerable additional equipment is now being installed to take care of rapidly increasing demands.

GORDON TIRE PROGRESS.

The new storehouse and shipping room now under construction for the Gordon Tire & Rubber Co., Canton, Ohio, will relieve 6,000 square feet of space in the mill room, thereby increasing efficiency and output considerably.

Several changes in the personnel of the operating-department also indicate the rapid expansion of the business. C. W. McKone, chief chemist of the Ajax Rubber Co., Trenton, New Jersey, will hereafter be mill room superintendent. E. R. Neubauer, of the Star Rubber Co., Akron, Ohio, has been appointed manager of sales of the druggists' sundries department, and E. R. Palmer, of the American Tire & Rubber Co., Mansfield, Ohio, has assumed the duties of chief of the cost department.

HYDRAULIC PRESS MANUFACTURING CO. EXPANDS.

The increased demand for their hydraulic presses, pumps, valves, accumulators and intensifiers, has led to the completion of plans for extensive plant and equipment improvements in the factory of the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, builder of vulcanizing presses. To relieve the crowded condition of the machine shop an addition 100 feet long by 60 feet wide will be erected and considerable new machine shop equipment will be needed, including a 20-ton electric traveling crane, a large motor-driven horizontal boring mill and a heavy-duty motor-driven planer.

A 20-foot extension will be added to the present power plant building and new equipment will be installed, consisting of a 300-horse-power Corliss engine and a 225-K-W generator. Two new steam boilers and stokers for three boilers will be added to the present boiler equipment. A building for oil storage will also be erected, the main stock room will be extended and another story added, giving additional space for the storage of small parts; the tool room will be enlarged and a new structural shop about 50 by 60 feet erected.

The plans also include an extension of the present erecting shop building, measuring 47 by 130 feet. For all of the building extensions brick and concrete construction with steel for the substructure will be used. All of the above improvements, except the last named, will be made immediately.

SAVAGE TIRES IN MICHIGAN.

The Savage Tire Corporation, of San Diego, California, has recently opened a Michigan office under the name of the Michigan Savage Tire Sales Co., with S. E. Straight as branch manager, and headquarters at 429 Grand avenue, Detroit. A $200,000 stock is carried, and will be increased as needed. Seventy subbranches have already been opened in various parts of the city and state.

NEW CLUBHOUSE FOR McGRAW EMPLOYES.

A recent campaign among employes of The McGraw Tire & Rubber Co., East Palestine, Ohio, to raise funds for a clubhouse resulted in subscriptions amounting to nearly $2,000. The company has now appropriated $10,000 additional as its donation, and plans have been prepared for the erection of the clubhouse on East Taggart street. The building will be two stories high in the front portion, the dimensions being 50 by 110 feet, exclusive of verandas. Every possible provision for the comfort and enjoyment of the employes will be made, including four bowling alleys in the basement, four or five pool tables, one billiard table, a barber shop, toilets, lockers and 15 or 20 baths, the latter being placed conveniently at the foot of a stairway leading from the gymnasium, 50 by 70 feet, at the rear of the main floor. This gymnasium will have a balcony around three sides. At the front, on the main floor, will be a large lounge, with a six-foot open fireplace, a library and music room, a cloak room, and committee room. The second floor of the front portion of the building will be devoted entirely to a well-equipped kitchen and dining room for use on special occasions.

RACINE AUTO-TIRE CO. TO BUILD.

The Racine Auto-Tire Co., Racine, Wisconsin, has recently purchased a four-acre tract of land, known as the Wisconsin-Illinois baseball park, on which a modern plant will be erected in the spring. The new plant will have a capacity of 1,000 tires per day and will be built so that this may be greatly increased by adding to the units. Machinery has already been ordered from the Farrel Foundry & Machine Co., and electrical equipment from the Westinghouse Electric & Manufacturing Co.

The Racine company is running its present plant night and day, to its full capacity of approximately 250 tires and tubes per day.

THE TWIN RIM.

It is rather a clever idea that is embodied in this new and practical first aid device for tire troubles and which is really a modified form of a spare wheel. It comprises a rim of the ordinary demountable type to which are riveted four lugs that are provided with slots for the fastening bolts. These are four specially formed clamps that fit over the inside of the felly and slip into the slots of the rim lugs. In case of a puncture or blow-out in either front or rear wheel the twin rim with the inflated tire upon it is placed beside the damaged tire, the clamps fitted in place, and by tightening the four bolts with a special wrench provided for that purpose the car is ready to run any distance. It is claimed that this complete device weighs only one-fifth that of other demountable rims and can be attached in 5 minutes. [Twin Rim Co., Boston, Massachusetts.]

NEW INCORPORATIONS.

A. B. & S. Cement & Rubber Co., October 13 (Massachusetts), $10,000. Arthur B. Alden, Brockton, Massachusetts; Daniel C. Smith, Morris A. Smith, George H. Bixby, William E. Bixby, and Charles H. Poor—all of Haverhill, Massachusetts. Principal office, Haverhill, Massachusetts. To manufacture and sell rubber cement, etc.

Achilles Rubber & Tire Co., October 19 (Delaware), $1,000,000. E. Von Vargyas; Lawrence A. O'Dea and Lorenzo G. Warfield—all of Washington, D. C. Principal office, Colonial Charter Co., 927 Market street, Wilmington, Delaware. To acquire lands and buildings in New York or elsewhere for the purpose of manufacturing rubber tires and other articles of like nature.

Aeromarine Engineering & Sales Co., Inc., November 3 (New York), $1,000. M. L. Weiland, 233 Broadway, New York City; Arthur H. Slack, 258 Lefferts avenue, and Henry Amerman, 439 Quincy street—both in Brooklyn, New York. To manufacture balloons, aeros, motors, etc.

American Chicle Co. of New York, Inc., October 25 (New York), $10,000. Thomas Adams, 763 Fifth avenue; John D. Adams, 1 West 72nd street—both in New York City, and Horatio M. Adams, Glen Cove, New York.

Beach, Knowles & Hill, Inc., November 3 (New York), $25,000. Charles S. Beach, 605 West 137th street; Paul H. Knowles and Luigi Solari, 205 West 89th street—both in New York City. To deal in auto parts and accessories, etc.

Big Four Tire & Rubber Co., The, September 5 (Delaware), $1,000,000. G. H. Ritchie (president), 280 Miles avenue; B. Wingerter, (vice-president), South Howard street; Dr. C. C. Spangler (secretary), 17 South Howard avenue, and O. P. Lamuel (director), Adams street—all in Akron, Ohio, and W. E. Wingerter (treasurer), 736 Guardian Building, Cleveland, Ohio. Principal office, 736 Guardian Building, Cleveland, Ohio. To manufacture and deal in tires and other rubber goods.

Christman Tire Co., Inc., November 13 (New York), $2,000. Jacob K. Christman, 247 Post avenue; Arthur A. W. Brewster, 569 Plymouth avenue, and Clayton R. Brown, East Rochester—all in Rochester, New York. Principal office, Rochester, New York. Auto tires, etc.

Columbia Scrap Rubber Co., November 1 (New Jersey), $50,000. Yvette Gordon, Louise De Piano, Frank De Piano, Joseph Gordon, Antonio De Piano—all of Trenton, New Jersey. To import, buy, sell and deal in scrap rubber, etc.

Crown Tire & Rubber Co., October 4 (Nebraska), $250,000. Henry A. Reichenbach, Omaha, Nebraska; Henry C. Meier, Council Bluffs, and Jesse P. Howe, Des Moines—both in Iowa. Principal office, Omaha, Nebraska. To manufacture and sell, wholesale, automobile tires and other rubber goods.

Deltire Rubber Co., November 9 (New Jersey), $25,000. Alexander Trapp; John R. D. Bower and Catherine Pippel Hornyak—all of Trenton, New Jersey. To manufacture and deal in rubber goods, etc.

Ehman Tire & Rubber Co., November 8 (Illinois), $150,000. A. C. Ehman (president), Francis Lackner (vice-president), M. J. Flynn (treasurer), Judge Jesse Holdom, W. A. Vail and A. B. Larkin. Principal office, La Salle and Twenty-seventh streets, Chicago, Illinois. To manufacture automobile tires and mechanical rubber goods.

Elkland Tanning Co., November 16 (Maine), $100,000. G. L. King (president), 71 West street; A. E. Pierce (treasurer), 23 Noyes street, and Charles L. Donahue (clerk), 277 Congress street—all in Portland, Maine. To manufacture and deal in rubber, etc.

Elliot Rim Chain and Tread Corporation, October 31 (New York), $100,000. D. Kern Einfurer, 1491 East Tenth street; Walter L. Perley, 1009 Lincoln Place, and Joseph J. Miller, 310 St. Johns Place—all in Brooklyn, New York. Principal office, Esopus, New York. Auto parts and accessories.

Englewood Tire & Supply Co., November 4 (Illinois), $5,000. F. F. Symonds, John H. Cadmus, and Oliver H. Starrett. Principal office, 501 West Garfield Building, Chicago, Illinois.

Fox-Senior Tire Co., July 15 (Connecticut), $25,000. C. S. Fox, T. R. Senior, C. M. Fox and S. P. Senior—all of Bridgeport, Connecticut. Principal office, 357 Fairfield avenue, Bridgeport, Connecticut.

Globe Auto Accessories Co., Inc., October 23 (New York), $500. William F. Watters (president), 26 Plymouth avenue, South; S. X. Newman (vice-president and sales manager), 453 Seneca Park Way, and F. B. Rae (secretary and treasurer), Ambrose street—all in Rochester, New York. Principal office, Ambrose street, Rochester, New York. To sell tires, tubes, etc.

Good-Wear Rubber Co., The, September 21 (Ohio), $500,000. W. E. Deve (President), H. B. Kishman and A. E. Beckel, Vermilion; Jacob E. Murbach, (vice-president), Walter E. Brooks, (treasurer), Elyria; J. J. Dauch, Sandusky; William Seher, and L. S. Grimm, Lorain—all in Ohio. Principal office, Suite 307, Masonic Temple, Elyria, Ohio. Manufacturer of tires, tubes, and rubber sundries.

Grossman, Emil, Manufacturing Corporation, November 8 (New York), $410,000. Harry Radzinsky and Julius Bregman, 233 Broadway, New York City, and Reuben Stern, 109 Walton street, Brooklyn, N. Y. Auto parts and accessories.

Keystone Rubber Co., October 16 (New Jersey), $25,000. Harry Johnson, Yardville; Albert Hughes and Richard M. J. Smith, Trenton—both in New Jersey. Principal office, Yardville, Mercer County, New Jersey. To purchase, buy, sell and manufacture soft rubber goods.

Kip Vulcanizing Co., Inc., November 9 (New York), $1,000. B. Franklin Klass, 523 West 152nd street, William T. Weidenman, 154 West 68th street, and Kenneth A. Palmer, 359 Mosholu Parkway—all in New York City. Repairing tires, etc.

L. P. Ross Co., Inc., November 9 (New York), $25,000. William H. Porter, 68 Mortimer street, Rochester, New York; Henry B. Hubbard and George H. Mayo—both of 1790 Broadway, New York City. Principal office, Rochester, New York. To deal in rubber goods, etc.

McClure Tire & Rubber Co., September 21 (Ohio), $15,000. J. A. McClure, Jr. (president); E. Buchnan (vice-president); R. T. McClure (secretary and treasurer); J. P. Eagleson (attorney), 8 East Broad street; and A. M. Howson, 446 West 8th avenue—all in Columbus, Ohio. Principal office, 212-216 East Gay street, Columbus, Ohio. To deal in tires, reliners, blowout patches, etc.

Minnesota Tire & Rubber Co., September 6 (Minnesota), $200,000. Harry A. Trenhold, Minneapolis; Nels L. Werner, Red Wing—both in Minnesota, and James W. Adams, Ellsworth, Wisconsin. Principal office, St. Paul, Minnesota. To manufacture and deal in tires, rubber goods and accessories.

Non-Deflating Inner Tube Co., October 24 (Ohio), $100,000. J. A. Sullivan, Henry Roegge, A. W. Stockman, M. D. Wagner, and John A. Elden, 1325 Williamson Building, Cleveland, Ohio. Principal address, 1325 Williamson Building, Cleveland, Ohio. To manufacture a non-deflating inner tube.

Nu-Way Cure Co., October 6 (Wisconsin), $20,000. R. C. Moore, 226 Hazel street; Joseph E. Freix, 519 North Broadway street; E. W. Gilsdorf, 414 Fifth street; J. J. Wirtz, 620 East Walnut street, and F. S. Kaup, 1116 Cherry street—all in Green Bay, Wisconsin. Principal office, Green Bay, Brown County, Wisconsin. To manufacture and sell a preparation for the purpose of curing punctures in pneumatic tires and all other automobile accessories.

Partridge, F. E., Rubber Co., Limited, The, September 25 (Dominion of Canada). F. E. Partridge (president), Vincent

Cooke (vice-president), F. M. Ker (secretary-treasurer). Principal office, Guelph, Ontario, Canada. To manufacture tires, tubes and druggists' sundries.

Port Arthur Tire Co., September 19 (Texas), $2,000. A. F. Hughes, C. M. Dismukes and J. R. Campbell—all of Port Arthur, Texas. Principal office, Port Arthur, Texas. Deal in tires.

Public Service Tire & Rubber Co. of New York, Inc., November 18 (New York), $100,000. Richard Krause, Clason Point; G. H. Empey, 446 Lexington avenue, and T. A. Anderson, 226 Utica street—both in Brooklyn, New York.

Quick Service Tire Co., Inc., October 24 (Texas), $5,000. F. Aitken, Alex Feigleson and Charles T. Butler—all of Beaumont, Texas. Principal office, Beaumont, Texas. To deal in tires, tubes, automobile accessories, etc.

Reuter Puncture-Proof Tire & Tube Co., October 6 (New Jersey), $125,000. George Joseph Reuter, 182 Montclair avenue; Alfred Strauss, 73 Hedden Terrace, and Louis R. Freund, 152 Johnson avenue—all in Newark, and Abraham M. Herman, Pleasantville—both in New Jersey. Principal office, 810 Broad street, Newark, New Jersey. To manufacture, buy, sell, import, export and generally deal in tubes and tires for automobiles, etc.

Runyan Cushion Wheel Co., October 12 (Nebraska), $100,000. H. O. Wulff, D. R. Sowards, E. J. Conrad, and Fred C. Burlington—all of Omaha, Nebraska. Principal office, Omaha, Nebraska. To manufacture a patent cushion wheel.

Rynehart Rim Tool Co., Inc., November 16 (New York), $5,000. Henry M. Rynehart, 17 Fulton street, and L. Nissen, 166 DeKalb avenue—both in Brooklyn, New York, and John H. Jansen, 41 Park Row, New York City.

S. & J. Raincoat Co., Inc., The, November 22 (New York), $1,000. Solomon Blickman, 38 Montgomery street, Joseph Golombeck, 38 Suffolk street—both in New York City, and Harry P. Sweetgold, 161 Kosciusko street, Brooklyn, New York. To manufacture waterproof clothing, etc.

San Francisco Tire Co., Inc., November 3 (New York), $6,000. Sydney Bernheim, 35 Nassau street, New York City; Catherine A. Weldon, 591 Seventh street, and Harry H. Jacobson, 555 Grand street—both in Brooklyn, New York. Tire manufacturing business.

Selum Manufacturing Corporation, The, November 13 (New York), $100,000. Stephen Oderwald and Rose A. Chenka, 231 Elm street, Astoria, New York, and Henry M. DeSulykowsky, 61 West 61st street, New York City. To manufacture Se-Lum and other auto supplies.

Schwab Improved Tire Co., October 10 (Minnesota), $50,000. John Schwab, Martin Schwab and William H. Ellinger—all of Minneapolis, Minnesota. Principal office, Minneapolis, Minnesota. To manufacture improved automobile and vehicle tires, parts and accessories.

Sheldon Tire Co., Inc., November 8 (New York), $1,000. Burton K. Sheldon, Charles Kuhn and Cleveland Pond—all of Buffalo, New York. Principal office, Buffalo, New York. To deal in auto tires.

Springfield Tire Service Co., September 14 (Illinois), $5,000. Edward G. Mitts, Philip Stewart, and L. L. Bingham. Principal office, 303 South Fourth street, Springfield, Illinois. To handle and sell automobile tires and accessories, etc.

Standard Tire & Rubber Manufacturing Co., The, April 4 (Washington), $500,000. Max Freed, Edward P. Fick, Ivan Bushong, R. Freed and F. N. Rhodes. Principal office, Seattle, Washington. To sell rubber tires and goods.

Stearns Rubber Co., October 20 (New Hampshire), $15,000. William A. Pressey (president), Hampton Falls, and William F. Stearns (secretary and treasurer), Exeter—both in New Hampshire. To take over the business of The Rubber Step Manufacturing Co., Exeter, Ohio, manufacturers of automobile tubes, rubber covered steps and pedals, and mechanical rubber goods and specialties.

Superior Rubber Co., Inc., October 23 (New York), $25,000. George J. Hagmaier, Pittsburgh, Pennsylvania; Elmer W. Hagmaier and Joseph Porzell, Buffalo, New York. Principal office, Buffalo, New York.

Syracuse Tire Co., November 1 (New York), $10,000. Sydney Bernheim, 35 Nassau street, New York City; Catherine A. Weldon, 591 Seventh street, and Harry H. Jacobson, 555 Grand street—both in Brooklyn, New York. To manufacture tires.

Tropical Tire & Rubber Co., Inc., November 16 (New York), $25,000. William W. Thomas, Alfred M. Lazarowitz, and Abraham Solomon—all of 51 Leonard street, New York City.

Twin River Rubber Works, Inc., November 22 (New York), $100,000. Julius Schmid and Charles F. Schmid, 470 Fourth avenue, New York City, and Paul Henkel, West Nutley, New Jersey. To manufacture rubber goods of all kinds.

Van der Linde Rubber Co., Ltd., October 26 (Dominion of Canada), $350,000. Harold van der Linde (president), H. C. Scholfield (vice-president), and T. D. Bailey (secretary and treasurer). Principal office, 142 Weston Road, Toronto, Ontario, Canada. To manufacture and deal in tires, tubes, packing, and general molded goods.

Washington Rubber Co., October 2 (Delaware), $50,000. Charles D. Cugle, Kenneth W. Cugle, Howard C. Newcomer, William J. Hart—all of Washington, D. C. Principal office, Delaware Charter Guarantee & Trust Co., 328 duPont Building, Wilmington, Delaware. To produce, buy, sell and deal in rubber and the articles and goods of all kinds of which rubber is a component part.

THE "EVER-WARM" SAFETY SUIT.

Recently a practical test was made in the Atlantic Ocean near Manhattan, just west of the West Banks light, of the Youngren life preserver. Thirteen demonstrators, three of whom were girls, clothed in "Ever-Warm-Safety-Suits," as they are called, leaped into the ocean, one after the other, from a steamer while under way. The illustration shows them grouped together, each supported in an upright position, warm and dry, waiting to be

rescued. This device was illustrated and described in THE INDIA RUBBER WORLD, November 1, 1915. [National Life Preserver Co., Inc., New York City.]

In a 28-room apartment in New York City renting for $30,000 a year, the kitchen, pantries and service rooms are floored with blue and white rubber blocks.

THE RUBBER TRADE IN BOSTON.

By Our Regular Correspondent.

THE rubber sole industry received a good boost at the monthly banquet of the Boston Boot and Shoe Club, when Ex-President Donovan, who is a leading manufacturer of men's shoes, declared that the present high prices of sole leather had led shoe manufacturers to substitute rubber and composition soles in some of their lines, and that experience had proved them to give better service than ordinary sole leather. Makers of this class of goods are receiving heavy orders, and leading shoe manufacturers are among their best customers. These composition soles are made of rubber in combination with other materials, added to give increased wear, and to prevent slipping. Leather cuttings, ground to a fibrous state, are used largely for this purpose, but cotton and flax fibers are also among the materials employed.

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But high prices are not confined to sole leather. Furniture and upholstery leathers, carriage and automobile leathers are all so expensive as to be almost prohibitive, and artificial leather is coming into use much faster in consequence.

Until recently attempts to produce an artificial leather to be used in shoe uppers have not been successful. A new material, made by the Reading Rubber Manufacturing Co., is already being used in considerable amounts for shoe topping. This is a coated fabric, closely resembling matcalf or gun-metal calf in appearance and texture. While it has not yet been used extensively in vamps, some manufacturers of infants' shoes are employing it for the entire uppers. The sales, through L. C. Chase & Co., of Boston, already exceed 100,000 yards.

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The Boston Woven Hose & Rubber Co. is adding still another building to its great plant at Cambridge. Like those recently completed, it is of reinforced concrete, comprises four stories and basement, and measures 65 by 324 feet. It will be used for the friction tape, coated fabric and molded goods departments. It stands on the site of the old friction tape department, and to avoid any stoppage of maximum output was built complete to the roof one half at a time. When all the alterations and contemplated additions to this plant are completed, it will be one of the finest and most up-to-date rubber manufacturing establishments in the country.

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The Converse Rubber Shoe Co. has just completed enlargements to its factory and shipping departments which more than double its floor area and producing capacity. Much of the new space is already occupied, but because of delays in receiving machinery, the full benefit of this extension has not yet become available. A gravity conveyor has been installed, also another motor, and new mixers and calenders will be added. Rest rooms and a restaurant have been established, while every department is being extended and enlarged to take care of increased business. The storehouse and shipping department, in an entirely separate building, have also been nearly doubled in size, giving additional facilities for carrying a much larger stock. To this building runs a railroad siding, for direct receipt of raw material and shipment of finished goods. The manufacture of tires is carried on in a separate building, which will be brought up to present requirements as soon as the footwear factory is in full running order. The present capacity of the latter factory is now 15,000 pairs of shoes daily.

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Wilbur N. Shelton has been appointed general manager of the L. J. Mutty Co., 175 Congress street, Boston, manufacturer of fabrics for the automobile, and tubing for automatic piano players, in which it has developed a large business. After completing his education, Mr. Shelton entered the employ of the Conant Rubber Co., of Hartford, Connecticut, and rose to the position of salesman in southern New England. For 23 years he was connected with the Franklin Rubber Co., Malden, Massachusetts, and for the last 10 or 12 years has been its general sales manager, visiting the large customers of this company in the principal western cities. Thus he brings to his new position an experience of great practical value. W. S. Osborne, formerly connected with the Boston Safe Deposit Co., is now with the L. J. Mutty Co. as assistant treasurer, succeeding F. H. Brown, who has retired.

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A new hospital has recently been installed at the factory of the American Rubber Co., East Cambridge. It is situated at about the center of the large group of buildings, and on the ground floor conveniently near the calender and mill rooms, where the most serious accidents are likely to occur. There are two intercommunicating rooms, one used as a hospital, or first-aid room, the other suitably fitted up as a rest room for the women employes in case of illness or fatigue. The hospital room has hard plaster walls, metal ceiling, and sanitary marbleoid flooring, and is finished throughout in white enamel. The regulation hospital furniture is of white enameled steel, and the room is otherwise equipped with every appliance and material necessary to give immediate treatment in any emergency.

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The Rockland Webbing Co., manufacturer of non-elastic and elastic webbings, at Rockland, Massachusetts, has taken a ten-year lease of the plant of the Victory Webbing Co., at North Abington, and will run both factories, thereby practically doubling the firm's productive capacity. The Victory Webbing Co. has already discontinued business.

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The recently completed garage of the Monatiquot Rubber Works Co., South Braintree, Massachusetts, is a semi-circular brick building located near the main office and adapted for the accommodation of officers' cars as well as commercial trucks. It is of the most modern type, each car stall being provided with a separate door entrance and individually equipped for washing and all maintenance.

An extension to factory building No. 3, now in progress, will soon make available an increased output of the Monatiquot company's products.

THE RUBBER TRADE IN AKRON.

By Our Regular Correspondent.

JUST what the tire industry has meant to Akron is shown by the tremendous increase in population and in building. In 15 years it has grown from a town of about 12,000 inhabitants to a great city of primary importance and known to motorists the world over. The building permits issued in 1915 represented an investment of $6,000,000, and for the first nine months of the present year, $9,800,000.

Long famed as the "Rubber City," Akron has now qualified as "Ohio's Eight-Hour Town." The Firestone, Goodrich, Goodyear and other rubber factories have recently adopted the eight-hour system, and while the results vary somewhat, general satisfaction is expressed by employers and operatives. The reports range from an increase in cost of production so slight as to be characterized as "about an even break" compared with the ten or twelve-hour work day, to a statement that in certain departments the eight-hour system has effected an 18-per cent increase in production with only a 10-per cent wage increase, while workmen are averaging the same pay per week that they did under the longer hours.

Tire factories are operated mainly by piece work, and in adopting the eight-hour day the rates were readjusted so that the men would receive at least as much money as before. The result

has been increased production and often increased wages together with reduced cost, except in a few departments where the differences are so slight as to be of little consequence. Tire builders average $4.50 a day as before; the lowest pay is $2.50 a day for sweepers, and from that up to $6 a day for heavy work. Quality is insured by rigid inspection and a limit on production where necessary.

The philosophy of this greater efficiency is best explained in the words of H. S. Firestone, president of the Firestone Tire & Rubber Co.: "There is nothing sentimental, paternalistic or philanthropic in our adoption of the eight-hour system. But you can't make men do their best unless you get them fully interested, proud of what they are doing, happier in mind, better in body and spirit, and producing something for themselves while they produce something for the business organization of which they are a part."

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At the annual meeting of the Firestone Tire & Rubber Co., which was held November 2, several important business matters were acted upon. The call for the meeting, dated August 31, proposed an increase of the capital stock to $50,000,000, and a stock dividend of 700 or 800 per cent. Instead of this the stockholders voted to fix the authorized capitalization at $15,000,000, and to reduce the nominal value of shares from $100 to $10. It was also voted to enlarge the board of directors from five to seven members, and to sell $500,000 worth of common stock to employes and officers.

Perhaps the action which received the greatest comment was the motion to set aside $1,000,000 for an employes' welfare and insurance fund. This, coming almost immediately after the dedication and presentation to the employes of the handsome new clubhouse, built at a cost of $300,000, adds another link to the great welfare chain that binds together employer and employes.

The election, at the annual meeting, of R. J. Firestone as vice-president came as the direct result of his splendid record as general sales manager for several years past. Under his direction sales have been increasing at the rate of 30 to 60 per cent annually until at the end of the fiscal year which closed August 1, Firestone business had exceeded $33,000,000. Mr. Firestone is widely known in motor car circles throughout the country and as vice-president will find even more and broader opportunities to utilize his knowledge, long experience and forceful personality to good purpose.

R. J. FIRESTONE.

A. G. Partridge, formerly assistant sales manager, has succeeded Mr. Firestone as general sales manager. Long service well equips him for the larger work and his appointment is in accord with the Firestone policy of promoting men who have made good. F. C. Blanchard has also been promoted to sales manager in charge of the increasing business among motor car manufacturers.

The B. F. Goodrich Co. has adopted a plan designed to coordinate the various departments of the factory more closely and bring the executives in closer touch with the employes. An operating committee has been established by the directors of the company, which will advise with and aid the executive committee in all matters affecting the interests and management of the company. The members of the new committee are as follows: H. E. Joy, director of costs of goods and factory costs; W. O. Rutherford, director of sales; H. K. Raymond, director of production; A. B. Jones, director of plant administration; W. C. Geer, director of development of goods and processes; George Oenslager, director of chemical laboratories; W. A. Means, treasurer; A. P. Lohmann, engineer; H. C. Miller, manager of tire sales, and W. H. Yule, manager of sales of general rubber goods.

Arthur H. Marks, of The B. F. Goodrich Co., is the owner of the largest yacht in American waters and probably in the world, fitted with internal combustion engines. The "Aramis" is 157 feet in length over all, with 23 feet beam and a draft of 7 feet 6 inches. Her motive power consists of two 350 horse-power Craig-Diesel engines delivering her power at 300 revolutions per minute. Built entirely of steel, she also has two steel deck houses, one covering the dining saloon forward, and the after one built over the music hall and reception room. She is finished in mahogany and bright metal work and so makes one of the handsomest yachts afloat. Her tanks carry 6,000 gallons of crude oil fuel, which gives her a very long cruising radius. Besides the staterooms for the owner and his guests, there are quarters aboard for the crew of nine officers and men required to run her.

Within a short time Mr. Marks will take an extended Southern cruise in his new possession.

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The Miller Rubber Co. is erecting a large eight-story building as an addition to its plant, and has also purchased 30 acres of ground in a suburb of Akron. The entire tire building plant will be located on this new property in the spring, the present factory being then devoted to druggists' sundries and other specialties.

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The Amazon Tire & Rubber Co. manufactures a standard tire with an extra side-wall breaker strip, or blow-out protection, added. At present, the factory turns out about 45 tires a day. Recent large increase in business has made it necessary to add to the plant in order to expand the production, and when the new four-story building now being erected is completed, the output will average 300 tires daily.

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The Goodyear Tire & Rubber Co. has purchased 10,000 acres of land in the Salt River valley, Phoenix, Arizona, where cotton raising will be undertaken on a large scale, thus insuring for the company's use a fixed supply of long staple Egyptian cotton.

James E. Taylor has been transferred from the Atlanta (Georgia) office of the Goodyear company to the home office, as special representative of the automobile tire department.

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The Phoenix Rubber Co. has increased its capital stock from $125,000 to $500,000.

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Two frame buildings are being erected for the Kelly-Springfield Tire Co. One will house the restaurant, now on the top floor of the main building, and the other the experimental department, this arrangement giving needed space for other purposes in the main building.

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Sam S. Miller, factory manager of the Mohawk Rubber Co., recently celebrated the completion of his twentieth year of tire

building. Beginning with solid carriage tires and pneumatics for bicycles, he was among the first to provide the necessary tire equipment for automobiles, and from that day to this has taken a personal pride in maintaining the quality of his product. His particular interest has been the careful choice of raw materials.

THE RUBBER TRADE IN RHODE ISLAND.

By Our Regular Correspondent.

THE month of November was a rather unsettled one in the rubber industry of Rhode Island, labor troubles having been experienced at two of the United States Rubber Co.'s plants —the National India Rubber Co., at Bristol, and the Alice rubber and shoe mill of the Woonsocket Rubber Co., at Woonsocket. In consequence of the strike at the National company's plant, work at the Narragansett Rubber Co. in that town was interrupted and the workmen threatened by the strikers if they did not go out.

While the situation at Bristol at one time appeared to be assuming a serious aspect, the firmness of the police and the severity of the court kept matters well in hand and resulted in an early understanding that led to an amicable settlement.

Throughout the state, rubber factories have an increasing number of orders ahead with a continued scarcity of help, although it is reported that applications for employment have recently been more numerous than at any time for several months. There appears to be no prospect of any immediate let-up in the demand for shoes, tires, medical goods and other lines made here.

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The announcement on November 23 of a 10 per cent "emergency increase because of abnormal world conditions," affecting 7,500 to 10,000 employes of rubber factories in Rhode Island, did much to clarify the situation, and it is now thought that there will be no further labor troubles, at least during the continuance of the present scale and agreement.

The notices posted at the mills controlled by the United States Rubber Co. announced that the increase was in the nature of a cash bonus, but those posted in the factory of at least one company were for a straight raise of 10 per cent. In another mill the management states that it was the third raise to its employes within the calendar year and that a new record in the payment of wages had been established in the trade.

The mills affected by the United States Rubber Co.'s notice in Rhode Island and the number of employes in each are the Alice Mills at Woonsocket, 1,600; the Millville Mill at Millville, 800; the Lawrence Felting Co. at Millville, 250, and the National India Rubber Co. at Bristol, 4,000. In Providence the Revere Rubber Co. employs 700 to 800 operatives; the Mechanical Fabric Co., 250, and the Narragansett Rubber Co. at Bristol, 700.

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The increased business experienced by the Narragansett Rubber Co., of Bristol, has been so great during the last few months that it has become necessary to provide additional factory room. A complete rearrangement of the plant with additional departments is under consideration, but meanwhile temporary arrangements are being made to take care of immediate demands. A new addition, 85 by 50 feet, has just been erected on the Richmond street side of the plant that will afford some relief for the present. Part of the lower floor will be utilized by the calendering department and the remainder will be occupied as a storehouse. The second floor will be absorbed by the steadily increasing shoe business.

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The two-story frame manufacturing building on South Main and Wheaton streets, Warren, is being remodeled for occupancy for storage purposes by the National India Rubber Co., of Bristol, by whom it has been leased.

John E. Magee, for the past 17 years electrician at the factory of the National India Rubber Co., is now policing the entire plant at Bristol.

Robert W. S. Cox, for several years sales manager of the insulated wire department of the National India Rubber Co., has resigned and gone into business for himself with headquarters at Boston. George Cragin has been appointed general sales manager of the wire division, coming to Bristol from New York, where for a number of years he held a responsible position with the American Steel & Wire Co.

William McCaw, formerly paymaster in the office of the National India Rubber Co. at Bristol, but more recently assistant treasurer of the Lee Tire & Rubber Co., Conshohocken, Pennsylvania, has recently been promoted to sales manager in the South, with an office at Atlanta, Georgia.

THE RUBBER TRADE IN TRENTON.

By Our Regular Correspondent.

THE "Best" fire hose of the Empire Rubber & Tire Co. won new laurels a few days ago when the city of Detroit, Michigan, placed an order for 8,000 feet of it. Detroit has been using Empire hose for some time and the best evidence of the satisfaction it has given is reflected in the order just placed. Never before has the mechanical goods department enjoyed such prosperity as at present. It is an old story about the tire department working both night and day to turn out 1,500 tires daily, and now this same gratifying condition of affairs has reached the mechanical goods department, now averaging $800,000 annual business. The molded hose department is also rushed with orders.

The big increase of the business of the Empire company has necessitated reorganizing and refinancing by incorporating under the laws of the State of Virginia. The new company, to be known as the Empire Tire & Rubber Corporation, has a capital consisting of $1,500,000, 7 per cent cumulative convertible preferred, par value $100, and $4,500,000 common, par value $10. The preferred stock is offered for public subscription by Andrews & Co., New York City, and is convertible at the option of the holder into an equivalent par value of common between June 30, 1917, and July 1, 1920. The new affiliations are expected to insure a $5,000,000 business annually, or about double the present output.

General C. Edward Murray, president of the Empire Rubber Co., Trenton, New Jersey, was among the speakers at the Chamber of Commerce dinner held recently at the City Club in Boston, Massachusetts.

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The Home Rubber Co. is erecting an addition to its plant costing $750,000.

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The Adolph Biller Rubber & Leather Cement Co. has been formed here, with Adolph Biller as the active head. The company has a well equipped factory, and for the convenience of the trade a down-town office has been opened. A new cement for automobile tires and the shoe trade is to be featured this year.

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The John A. Roebling's Sons Co. is among the concerns which have been allotted space in the electrical and industrial show to be held in Masonic Temple from the first to the fifth of this month.

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John Hermann, Jr., superintendent of the Woven Steel Hose & Rubber Co., paid a novel election wager when he wheeled a Wilson man through the streets in a barrow. A drum corps accompanied the outfit and there were about two score people trailing behind burning red fire, beating on pans, etc.

The India Rubber Trade in Great Britain.

By Our Regular Correspondent.

THE calling of men to the colors proceeds apace with more disastrous effects upon small businesses than upon large ones. Few firms have had to close down entirely for this cause, but one instance has come to my personal knowledge. This is the interesting crude rubber washing business that was carried on by the late Mr. Eyre at Holywell, North Wales. Since Mr. Eyre's death the business known as the Meadow Mills, Limited, has been carried on by his son, but the recent calling of many of the hands and of William Eyre himself to the colors has necessitated the temporary stoppage of the works, which are interesting from the fact of the motive power for the rubber washing machines being derived from a water-wheel. The company has an office at 4 South Bridgwater street, Liverpool. Possibly there are other cases of closing down in the rubber trade, but as a rule dilution of labor has enabled the management to keep going, even if on a smaller scale than customary.

AMERICAN CHEWING GUM IN ENGLAND.

There is no getting away from the war, and a minor point of some interest which has resulted from its incidence is the popularization of American chewing gum in Great Britain, where its use was formerly practically unknown. It is said that about 40 years ago the chewing of pure erasing rubber was not unknown in certain circles, a working day being required by the operator to reduce the material to a pulp. I understand that the present-day American product, as used by Canadian soldiers, is a much superior article to erasing rubber, so it is quite probable that the chewing habit will become popular here.

PETROL AND SUBSTITUTES.

The petrol restrictions, as was anticipated, have had a considerable effect on the tire industry; an effect which would have been more pronounced if they had come into force earlier in the summer. With regard to the use of substitutes, several of which have made their appearance on the market, some appeal cases are pending, arising out of conviction of charabanc owners in courts of summary jurisdiction.

CRUDE RUBBER.

There is nothing new in the raw rubber situation, except in the magnitude of the stock on hand, which some say is in part already the property of the enemy, to be utilized when the long deferred peace comes. A topic which has occasioned a good deal of wonder and talk is the enormous expansion of the American imports of rubber, which have risen from 57,253 tons in 1913-14 to 117,441 tons in 1915-16. Progress like this ought to reassure those pessimists who foretell a glut of rubber a few years hence.

VULCANIZATION WITHOUT SULPHUR.

Our contemporary, the "India Rubber Journal," has recently given an important translation of Ostromyslenski's papers in Russian on the subject of vulcanization. The researches detailed in these papers deal with (1) the hot vulcanization of rubber by nitro compounds without sulphur and (2) the hot vulcanization of rubber by means of peroxides or "per-acids" in absence of sulphur. I shall not reproduce any part of these papers here, as they were reprinted in THE INDIA RUBBER WORLD for November, but merely wish to call attention to what are undoubtedly discoveries in rubber chemistry and which may have a profound influence upon rubber technology. I say "may" rather than "will," because, as we all know, the best and in most cases the only reliable test of a novelty in rubber manufacturing procedure is that of longevity. In the past we have been taught to avoid the use of bodies such as peroxides in rubber and there will be many who will prefer to wait and see what the rubber looks like after a year or two before allowing themselves to wax enthusiastic over the new discoveries.

So far I have not found any enthusiasm on the subject among the purveyors of sulphur specially prepared for the rubber trade, but they console themselves with the fact that the much talked of use of amido compounds in vulcanization has not brought about any appreciable diminution in the volume of their business.

An interesting point for the future is how the rubber vulcanized without sulphur will behave under the various reclaiming processes. It is quite possible that superior reclaims will be obtained by some modification of the chemical reaction involved. Another point to be considered is that sulphur is frequently used as a filler to add bulk to the rubber in addition to effecting vulcanization. In this case it does not usually rank as mineral. In order, then, to keep the specific gravity the same, a substitution of some other mineral matter for the sulphur would have to take place, as the new vulcanizers are used in such small quantity.

ESTIMATING THE SULPHUR IN RUBBER.

Another paper by J. B. Tuttle and A. Isaacs on the estimation of total sulphur in rubber, and emanating from the Bureau of Standards, Washington, U. S. A., is full of interest and seems to emphasize the opinion I came to years ago, that it is difficult to lay down any method that is equally accurate with all rubber goods, from toy balloons to perambulator tires. A method that may give excellent results with rubber of one composition may prove faulty in the case of quite another composition. A point that must not be lost sight of is that time is often of greater importance than extreme accuracy. In a great many industries analytical methods of quite sufficient accuracy are in daily use, because results are wanted and it is impossible to wait a week for them. Many methods which are properly indispensable in the research laboratory where time is of no object are frequently put before the worthy chemist, who finds it impossible to employ them. Of course, if the new vulcanization without sulphur comes to anything, the correct estimation of this element loses its present importance.

SCOTTISH BUSINESS NOTES.

The North British Rubber Co., Limited, Edinburgh, has issued an attractive illustrated booklet comprising a price list for sand shoes and tennis shoes for 1917. With regard to these it is a condition of sale that in the event of a notification of an advance in price during 1917 no sales shall be made by customers below such advanced prices, even though the goods may have been delivered by them prior to the date of such advance. A novelty in the list is the khaki-colored canvas shoe which it is stated is much in demand in military circles, presumably such circles as are still in training at home.

The special grooved soling, which was brought out by the company, is intended to get over the trouble of breakage at the base of the groove. The grooves do not run directly across the sole, but are at a slight angle, which quite overcomes the difficulty previously experienced. The Clyde Rubber Works, Limited, which a few years ago removed from Glasgow to more commodious premises at Renfrew, a few miles away, reports very good business in mechanical rubbers, especially for railway requirements, in which the company specializes. Mr. Sharp and his son are the moving spirits in the management of the works.

RUBBER SPONGES.

Like food and all sorts of other commodities, the natural sponge has risen in price owing to the war. This has led to an increased demand for the rubber sponge, a demand which is being satisfied to a large extent by importations from America. As one now rarely sees in the shop windows the mystic Russian characters adorning labels on sponges, it looks as if the well-

known, high class rubber sponges of the Russian-American India Rubber Co., of Petrograd, had ceased coming, or at any rate only in reduced quantities. American sponges are being sold at the low price of sixpence at the F. W. Woolworth & Co., Limited, new stores in Manchester. Rubber household gloves can also be bought at these stores for sixpence each, one glove if you do not want a pair.

DUNLOP RUBBER CO.

This extremely successful rubber manufacturing firm has again increased its capital, this time to three million pounds by the creation of one million cumulative 6½ per cent preferred shares of £1 each. The proceeds of this issue are intended to finance the carrying of larger stocks, and also to provide working capital for a new department for the manufacture of solid motor tires for transport purposes. Sir Arthur Du Cros, Baronet, who presided at the meeting, made some rather trenchant remarks about foreign competition. The new association of British Tyre Manufacturers, of which he was president, have it as their main object, he said, to protect the interests of British manufacturers, there being no question of amalgamation to control prices.

SOME FOREIGN RUBBER NOTES.

SWISS MARKET FOR EBONITE.

THE American Consul at Berne, Switzerland, reports that, despite a considerable home production, about $25,000 worth of foreign ebonite of the better qualities was purchased yearly by Switzerland before the war, principally from Germany, Italy, and France. Present importations, however, amount to only one-fourth of that figure. No more rubber or kindred articles can be obtained from Germany, but Swiss buyers have been able to obtain small quantities from France and England. Efforts are also being made to obtain goods in the United States, but importers are experiencing difficulty in getting deliveries.

One large Berne concern, which makes practically all of the telephonic and telegraphic apparatus used in Switzerland, and is said to be one of the largest consumers of ebonite in the country, bought up all the ebonite that could be found in the republic. It was thus able to continue business in the ordinary way, but its small stocks are decreasing rapidly. An order placed in America six months ago by this firm is still unfilled. The company uses ebonite in sheets, thickness 0.5 millimeter to 30 millimeters [0.019685 to 1.1811 inches], in round rods from 2 to 30 millimeters [0.07874 to 1.1811 inches], in tubes from 2½ to 3½ centimeters [0.98425 to 1.37795 inches], and various other forms and sizes.

It appears that Swiss consumers are buying direct from the manufacturers, either domestic or foreign. There are no local agents or dealers in the trade. Before the war ebonite goods were sold by the Swiss manufacturers on terms of 30 days with 2 per cent., or 3 months net. On imported wares the terms formerly were 30 days net after arrival of goods; since the war, cash against documents. The duty on ebonite in bands, sheets, various forms of manufactured articles, cords, bullets, rods, etc., is $0.0875 per 100 pounds.

The following are the principal consumers of ebonite:

Hasler Aktiengesellschaft Telephon & Telegraphenwerkstätte, Schwartzthorstrasse, Berne; Schaerer Aktiengesellschaft, Sanitätsgeschäft, Berne; E. F. Buchi, Optische Werkstätte, Berne; Stoppani Aktiengesellschaft, Präzisionswerkstätte, 25 Neuen Königstrasse, Berne; Société des Condensateurs Électriques, Fribourg; Société de la Fabrique d'Appareils Électriques, Neufchâtel. Haaf & Co., Liebefeld bei Berne.

G. Keller, Kautschukwaren, Biel (Berne), is a wholesale dealer in rubber goods.

FRANCE RELEASES CARBON TETRACHLORIDE.

An order of the French Government, dated November 11, 1916, abrogates the prohibition of exportation of carbon tetrachloride. This chemical was included among articles placed under embargo by a decree of October 26, 1916.

IMPORTS OF RUBBER GOODS.

The Department of Import Restrictions announces that it has been decided that where goods falling under a prohibited description are made wholly or mainly of rubber, importation into the United Kingdom is permitted under general license.

SWEDEN AND PARCEL MAILS TO RUSSIA.

We learn here that Sweden has released parcels mails between this country and Russia which were under embargo in transit through Sweden early this year. Among these parcels were 54 packages of rubber goods, chiefly rubber heels.

THE RUBBER TRADE IN GERMANY.

DESPITE the demands of the present, industrial Germany is not losing sight of the future; it is realized that international trade competition will be very keen after peace is declared. Our manufacturers foresee that they will be called upon to increase the productivity of their factories tremendously, and are already organizing for industrial preparedness.

MANUFACTURERS' TRUST.

To unify and combine our efforts in the commercial struggle after the war, an important step was taken recently. The Industrial Council which has been formed, virtually unites our entire manufacturing industry. It provides a "connecting-link" between the Central Association of German Industrials, the League of German Industries and the Society of German Chemical Industries. These organizations, which have been collaborating since the outbreak of the war, now form an alliance on a permanent basis in order to coöperate in meeting new conditions after the war and to recover our lost world trade.

Rubber manufacturers are well represented in this consolidation; so also are our cable manufacturers through their syndicate.

RAW MATERIALS.

Our greatest inconvenience continues to be the shortage of raw materials. We are doing our best with this problem at the present time and not losing sight of its vital importance in preparing for the "after war." We realize that our wonderful substitute materials, however convenient they now are, will not all be of great use in peace times.

SYNTHETIC RUBBER.

The production of synthetic rubber was, of course, achieved long before the war. Bayer & Co., of Elberfeld, produced it several years ago, but it was too costly to be of real commercial value under normal conditions. Since the outbreak of the war, crude rubber has become so scarce and so costly that the synthetic product has found a ready market. Bayer & Co. continue to manufacture artificial rubber and have been joined in this line by the Franz Clouth Rheinische Gummiwarenfabrik, Cologne-Nippes. Synthetic rubber is now used in compounds for both hard and soft rubber goods. For the latter, however, it is usually employed in connection with either crude or reclaimed rubber. Of the durability of goods produced from artificial rubber, little is known, but their cost is very high; so high that they will not be able to compete with goods made with crude rubber at normal prices.

RECLAIMED RUBBER.

Reclaimed rubber continues to be much in demand and to bring really exceptional prices, especially when one considers the fact that only goods of inferior quality can be produced from it alone, without any addition of the crude product.

RATTAN TIRES.

Reclaimed rubber does fairly well for tire casings, but is practically useless for making inner tubes. Its price, as already stated, is very high for the service it gives, and this has led to many attempts to create substitutes for rubber tires.

Bicycles equipped with tires made of woven rattan were seen recently on the streets of Berlin. They are said to provide resiliency equal to that of solid rubber tires, but not so great as that of pneumatics. The sad thing about rattan tires is that rattan is not a domestic product; it is scarce and costly, although it may be possible to obtain adequate supplies of it through Turkey.

LIQUID GLOVES.

Our newspapers have been giving much space to what they term "liquid gloves" that are worn by army surgeons and their aids when performing operations or dressing open wounds. Before the surgeon begins an operation he sterilizes his hands, as usual, and then rubs over them an antiseptic solution of cellulose, which dries rapidly, forming a thin artificial skin which is entirely flexible though not so pliable as very fine rubber, which it much resembles. After the operation the cellulose can be removed quickly with warm water and certain chemicals.

From what can be learned about these "liquid gloves" they are not altogether satisfactoryy and are used only for short operations when suitable rubber gloves are not available. They are not sufficiently durable to enable one to undertake long operations with them, and when left any length of time on the hands they cause them to become numb and swollen. Though the daily papers have spoken of "liquid gloves" being in general use among army surgeons, this is hardly correct. It would be nearer the truth to say that these gloves are used mostly by nurses and assistants who formerly used no gloves at all.

RUBBER COMPANIES AND WAR LOANS.

Our rubber manufacturers continue to be large subscribers to war loans. The Continental Caoutchouc & Gutta Percha Co., of Hanover, subscribed 5,500,000 marks [$1,309,000] to the last war loan. Other companies subscribed in proportion to their wealth and importance.

THE SITUATION IN RUSSIA.

By A Special Correspondent.

THERE is a strong analogy between the economic and industrial problems of Russia today and those of the United States at the time of your Civil War. Fifty-two years ago your country was struggling for national existence, you had a colossal

SOCIÉTÉ KAUTSCHUK WORKS, RIGA.

war debt, your currency was much depreciated. Yet you were on the morn of your most remarkable period of industrial and commercial development.

In the present war Russia is struggling for national life and is undoubtedly at the same time opening a new era of industrial development and material prosperity. Russia, unlike most of the other countries engaged in this great war, has behind her huge undeveloped resources, just as the United States had half a century ago, and the drain of the present struggle stimulates us in developing these resources.

You Americans seem to know remarkably little about Russia. Of first-hand information you have very little, and you are too much inclined to imagine Russia as she was prior to the Russo-Japanese war. You forget to note the fact that between 1901 and 1914 Russia's industries had increased enormously; that her trade had doubled and that, as a consequence of both, the money in Russian banks and in circulation multiplied from $918,000,000* to $1,938,000,000*, an increase of about 111 per cent. During the ten years between the Russo-Japanese war and the present war, Russia's wealth was actually doubled. Bearing this absolute, fundamental fact in mind, you will be able to imagine the momentous occurrences in Russian economic life in connection with the present war.

EFFECT OF WAR ON INDUSTRIES.

Since the outbreak of the war most of our industries have been mobilized and are working for military purposes only. This mobilization has meant much to all our industries and especially to the middle-class and small industrial undertakings which have been obliged to adopt efficiency methods they never before dreamed of. It is impossible to state the quantities of goods of all kinds that have been produced here for the army, but I may mention an instance where one organization alone, from the beginning of the war up to August, 1915, produced three million pairs of army boots and more than a million pairs of snowshoes; a production all out of proportion to anything it had done before the war.

Our unprecedented industrial activity of the past two years has made domestic trade well above normal in spite of the fact that millions of men have been taken away from their homes. The buying power of our population has increased remarkably both in the cities and the rural districts.

RUBBER FOOTWEAR.

The increased prosperity of the masses and the impossibility of spending money for intoxicants, which are prohibited, have led to its expenditure for wearing apparel. Every good Russian who can afford to do so wears rubber shoes of some kind or another. Our great rubber companies owe most of their prosperity to the manufacture of footwear which, prior to the war, they supplied to millions both here and abroad.

When the war came our rubber companies had large stocks of footwear on hand and very little got out of the country before the export embargo went into effect. Although there was a temporary stoppagé in the manufacture of these goods, their production is now near normal and nothing is going abroad. Russia today is probably consuming 150,000 pairs of rubber shoes each day.

RUBBER FACTORIES.

Germans, who formerly controlled and operated most of our rubber factories, have been entirely eliminated and this great industry is centering in Moscow, the old Russian capital.

The Russian-American India Rubber Co., "Treügolnik," still retains its factories in Petrograd, and the rubber reclaiming plant in Odessa, owned by an American concern, is, as far as I can learn, still in operation there, but the Russian-French India Rubber, Gutta Percha and Telegraph Works, "Prowodnik," have definitely removed their entire equipment from Riga and are now in full operation in their new Moscow establishment where they are employing more than 25,000 people, mostly Russians, who have been trained to take the place of the "Baltic labor" that was formerly employed in Riga. The Imperial Government contributed 12,000,000 rubles [$6,180,000] towards the cost of the new plant.

The plant which the French Etablissements Bergougnan had

*These figures are based on normal exchange of rubles.

installed in Riga a year prior to the war, and which is known as the Société Kautschuk, has also been removed to Moscow where it is now in full operation producing tires for our armies.

RAW MATERIALS.

Our rubber factories have at no time had to suffer from any shortage of crude rubber; they had immense stocks on hand when the war broke out and have continued to receive shipments in proportion to their requirements. Chemicals and compounding ingredients have at times been very scarce, but not enough so to prevent our rubber manufacturers from maintaining their enormous production.

RUBBER WASTE.

Progress has been made in the rubber reclaiming industry here since the outbreak of the war, but the quantities of rubber scrap—mostly footwear—that are accumulating are tremendous, and prices are very low. This old rubber is being collected gradually, sorted and stored for keeping until normal conditions will permit its exportation.

Prior to the war we exported rubber waste in very large quantities to England, the United States and Germany. The last three normal years previous to the war these exports to the United States alone averaged 6,235,916 pounds in weight and $492,425 in value per annum.

It is rumored that the Russian Asiatic Bank, probably the principal owner of our large trans-Atlantic and trans-Pacific steamship companies, is helping to finance the collection, sorting and storing of rubber waste which will be exported after the war.

NEW RUBBER CEMENT.

Unlike the soldiers of the other warring nations, most of whom travel by train or motor, the millions of our troops have to march, and the problem of keeping their feet from direct contact with the ground is no small one, especially in view of the fact that machinery for re-soling boots is rare in Russia and hand-work requires much time.

This condition of affairs led to the idea of cementing rubber patches and half-soles to worn-out soldier's boots, but this, too, was a long operation until a rubber expert discovered a cement which is not affected by variations of temperature, can be used cold, and dries so quickly that a good workman can repair from 200 to 230 boots a day.

This discovery was made in 1915 when, as a first experiment, a company of infantry of 200 men was shod with rubber soles applied to their boots with this new cement. The results were so gratifying that now there are many Russian regiments marching on rubber soles and I understand "rubber-cobblers" trained to use the new cement, will be attached to each and every company of the army.

THE RUBBER TRADE IN JAPAN.

By Our Regular Correspondent.

ACCORDING to the latest reports from the Agriculture and Commerce Department of the Japanese Government, crude rubber imports in 1915 amounted to 3,903,550 pounds valued at $1,715,793, an increase of 1,598,288 pounds and $708,479 over the preceding year. The imports at Kobe alone reached 2,350,376 pounds valued at $1,608,594.

CRUDE RUBBER IMPORTS.

	1914.		1915.	
	Pounds.	Value.	Pounds.	Value.
British India	406,676	$223,637	1,114,441	$470,329
Straits Settlements	1,646,556	678,730	2,017,176	863,593
Dutch India	13,034	1,678	299,774	113,083
Great Britain	224,500	159,312	352,164	196,865
Germany	1,468	1,200	1,900	514
United States	11,914	8,166	98,430	58,819
Mexico	.....	.....	3,700	3,262
Philippines	.....	.....	3,976	2,235
Other Countries	1,114	581	11,989	7,098
	2,305,262	$1,073,319	3,903,550	$1,715,793

TIRE INDUSTRY GROWING RAPIDLY.

The increase was due to the demands of the newly established works in Tokio and Osaka and much enlarged consumption of the Dunlop Rubber Co. (Far East), Limited, the Kakuichi Rubber Co., and other leading firms. The Japanese rubber industry has been making great progress. Goods of every description are being manufactured at rather lower prices than hitherto, not only for home consumption—supplied by imports before the war—but to meet foreign demands as well. For instance, bicycle tires are now being made at 1.80 yen (90 cents) a pair, former prices being 5-6 yen ($2.50 to $3.00) a pair. Tire manufacturers in Tokio and Osaka have manufactured sixty to seventy thousand pairs for foreign orders and many more for jinrikishas, which were formerly imported from Germany. The Dunlop Rubber Co. (Far East), Limited, manufactured ten times the ordinary annual output of bicycle and automobile tires to fill the British orders.

CRUDE RUBBER FROM CEYLON, JAVA AND ENGLAND.

Imports of crude rubber from Ceylon increased greatly during the Singapore embargo from October, 1914, to April, 1915, but fell off again after the latter date because of the lower Singapore prices and the shorter distance to Japan. Singapore imports included plantation pale sheet, smoked sheet, mixed sheet and pale crêpe in about equal quantities. Native rubber from India and Borneo, previously much used by Japan, were not in demand because of the supply of plantation rubber.

Crude rubber from Java, never imported before, began to come in after the Singapore embargo was declared, and still continues to be imported because the prices are lower. Both smoked sheet and crêpe are received. Japanese rubber manufacturers could scarcely have maintained their output except for Japanese imports.

Crude rubber from England could be imported during the embargo, but at first little use was made of this fact because of the time required and the fear that the embargo might be removed before receipt of the British goods. During the autumn, however, large British shipments were received for the manufacture of bicycle and automobile tires for export. Crude rubber was also wanted from the United States, but American prices were higher than British and shipping facilities were not so good as from England.

The crude rubber quotations in Osaka, 1915, were as follows:

	January-April.		July-August.		November.	
	Yen.	United States Currency.	Yen.	United States Currency.	Yen.	United States Currency.
Borneo rubber...*per 100 pounds*	..	....	63.75	$31.88	75	$37.50
India rubber	85	$42.50	85.00	42.50	100	50.00
Pale sheet	105	52.50	115.00	57.50	150	75.00
South American Para	150	75.00	140.00	70.00	160	80.00

RUBBER TIRE EXPORTS.

In 1915, tire exports amounted to 2,512,966 pounds valued at $1,706,316, an increase of 1,630,191 pounds and $1,163,181 over the previous year. Detailed figures follow:

	1914.		1915.	
	Pounds.	Value.	Pounds.	Value.
China	346,120	$203,192	625,837	$376,311
Kwanton Province	4,556	2,716	7,916	3,489
Hongkong	2,938	1,366	61,365	39,699
British India	37,756	30,720	367,318	241,452
Straits Settlements	224,470	142,086	1,008,330	730,476
Dutch India	250,224	158,327	92,545	57,537
French India	750	527	92,545	57,537
Great Britain	5,758	3,805	348,654	256,774
Siam	140	78	452	152
Germany	10	11	.....	.....
United States	10,000	241	.....	.....
Canada	53	66	.....	.....
Australia	.....	.....	332	278
Total	882,775	$543,135	2,512,966	$1,706,316

Aside from supplying home demands the Japanese rubber industry has made great progress in the export of rubber tires and other goods to Straits Settlements and Asiatic countries supplied by European countries previous to the war. Large or-

ders have recently been shipped to Europe for military purposes. Even the Chinese, who had boycotted Japanese goods, were obliged to buy them in great quantity. Jinrikisha tires were exported to tropical lands where bicycles are almost unknown and some of them were probably re-exported to Europe for other uses by the Allied armies. Of the total tire exports, 60 per cent was jinrikisha tires and the other 40 per cent bicycle and automobile tires in nearly equal quantities. The firms engaged in this business are the Dunlop Rubber Co. (Far East), Limited, the Toyo Rubber Co., Limited, the Mitatsuchi Rubber Manufacturing Co., the Kakuichi Rubber Co., the Nihon Rubber Co., Limited, and other works. Automobile and bicycle tires for export were made principally at the Dunlop works.

Jinrikisha pneumatic tires for export are 900 by 50 millimeters, not the 43-inch size common in Japan. Automobile tires for export are mostly pneumatics 34 by 3 and 28 by 3, although some consumers order by metric measure. Bicycle tires for export are 28 by 1½ and 26 by 1½, not 1⅜ as in Japan. Wired-on tires are made only by the Dunlop Rubber Co. (Far East), Limited.

Despite the high prices of crude rubber and compounding ingredients since the war, the export prices have remained relatively low, as follows:

Jinrikisha tires (including tube), per pair, 20 yen ($10.00).
Automobile pneumatic tires, each, 35-80 yen ($17.50 to $40.00).
Bicycle tires, per pair, 5-13 yen ($2.50 to $6.50).
Tubes for bicycle tires, per pair, 1.30-2.00 yen ($0.65 to $1.00).

THE RUBBER TRADE IN MALAYA.

By Our Regular Correspondent.

THOUGH war has had little or no effect on the rubber plantation industry of Malaya, there are a good many who say that because of the war it is necessary to make preparations for the future. It is in the coming trade war, which the Allies are steadily bent upon, that the need of combination and organization in the industry will be felt. The chairman of a prominent rubber company recently referred to the entire lack of these important qualities while emphasizing that the need for them was never so apparent as to-day.

The purchasing of rubber, he pointed out, is getting more and more into the hands of powerful and aggressive groups who are adept in the art of depressing the market for a month or two before they make their heaviest purchases. For the trade war which is to follow upon the declaration of peace, practically every great industry is already taking steps to organize its plan of campaign, with the one great exception of the rubber plantation industry. The Germans, on their side, are not idle. They have already formed central societies which will buy for each large industry, and as regards rubber the German Empire is going to need an immense tonnage of the commodity when the war is over. Many manufacturers of rubber goods contend that for every pound of new rubber used in manufacturing rubber goods two pounds of recovered rubber are also employed. That stock of recovered rubber has run out in Germany, and the requirements of the country will be very great indeed when there is an opportunity to supply them.

It is suggested that a very simple means of helping to strengthen the rubber plantation industry is to popularize and extend advance contract sales, and thus reduce as far as possible the amounts of unsold rubber arriving on the market at any one time. As previously pointed out, when at the end of last year a number of companies found that with the rise in the price of rubber the advance contracts they had necessitated selling at less than the current market price, many thought that the advance contract policy was not a good one to continue. The idea that this method circumvents the schemes of powerful groups who can depress the market a month or two before buying is a new one, and it is certainly seems worthy of some consideration.

The Planters' Association of Malaya, the organization of the planting community, touched upon a large question at one of its recent meetings, when the secretary reported the result of his interview with the Chief Secretary to the Government on the subject of the alienation of planting land. Particulars of applications for such areas, said to have been made on behalf of various American companies, were given, and it was rightly observed that the question was a broad imperial one, upon which the association was hardly called upon to express an opinion. In so far as it went, however, the secretary's statement disclosed an attitude of distinct hostility to such alienation of land in existing circumstances, and there is probably a widespread, though unexpressed, feeling to the same effect in many other parts of the country. The government has given an assurance that no such alienations have taken place, and with that the planters may rest satisfied. No doubt the matter will be allowed to lapse until it is known how definite action one way or the other will coincide with the Imperial interests of the nation.

The industry in Malaya, by the way, has good reason to be grateful to the Federated Malay States Department of Agriculture, which is continually conducting investigations with reference to the improved production and subsequent treatment of rubber. Lectures on the subject are constantly given to planters in various states, and at a recent one, B. J. Eaton, agricultural chemist, detailed some highly interesting experiments with regard to the variability of plantation rubber. After describing the vulcanizing process, discovered independently by Goodyear in America and Hancock in England, Mr. Eaton gave a review of the results attained by the Federated Malay States Agricultural Department. These showed that the principal variability of plantation rubber was in respect to the rate of vulcanization in the case of first-grade rubber, and that differences in strength after vulcanization were of a much smaller degree.

As regards the uniformity of fine hard Para, Mr. Eaton suggested that this was due to the fact that a ball of hard Para took about two months to prepare, and thus a daily variation in the latex or the treatment to which it was subjected was averaged. One method of insuring uniformity in estate practice could be effected by mixing a sheet from each day's latex in each box over a period of a month or more.

The method of preparing rubber by keeping it in the form of coagulant for six days before machining proves to be very valuable from the viewpoint of rapid vulcanization and of quality. It is interesting to know that one of the leading American manufacturers recently asked for a consignment of about half a ton of this type of rubber for testing purposes.

NEW RUBBER EXPORTING CONCERN IN BRAZIL.

Stowell & Cia. is the name of a new concern with headquarters at Para and a branch office at Manaos, State of Amazonas, which will devote itself exclusively to the purchase and exportation of rubber, as agents for Heilbut, Symons & Co. of London and Liverpool, and Arnold & Zeiss of New York City. The members of the firm are T. B. Stowell, Albert Suter and Henri Voegeli, Mr. Suter having charge of the principal office at Para, and Mr. Voegeli being manager of the Manaos office. This new concern has no connection with the firm bearing a similar name in Liverpool. Messrs. Stowell Bros., Para, and Stowell & Sons, Manaos, which are branches of Stowell & Co., Liverpool, England, state that they continue their business as heretofore and that there is no change nor alteration in their firm names or business.

RUBBER EXPORTS FROM THE IVORY COAST.

Exports of crude rubber from the Ivory Coast during the first six months of 1916 amounted to 503,358 pounds, against 145,871 pounds exported during the corresponding period of 1915, showing an increase of 357,487 pounds.

Rubber Planting Notes.

A NEW RUBBER COAGULANT.

"COAGULATEX" is the name of a new chemical now widely advertised in Far Eastern papers and recommended as superior to and more economical than acetic acid as a rubber coagulant. The Chemical Laboratory of the Agricultural Department of the Federated Malay States acquired a sample of Coagulatex for investigation and has published a preliminary note on the subject.

It consists of a heavy yellow-colored liquid, strongly acid, and, on analysis, found to contain sulphuric and hydrochloric acids, the latter being present in small proportion only together with a small percentage of some mineral constituent of salt.

The value of this as a coagulant depends almost entirely on the sulphuric acid, since other constituents would have little or no effect. B. J. Eaton, author of the preliminary note in question, remarks:

It is stated in the advertisement that "Coagulatex" contains no vegetable matter; the utility of this statement is somewhat doubtful, as the absence of vegetable matter is by no means an advantage. Many vegetable acids, *e. g.*, citric, tartaric acids, etc., are good coagulents, their chief drawback being cost. Acetic acid is an organic acid, *i. e.*, of vegetable origin, which is a decided advantage, since an excess of such an acid is not likely to have such deleterious effect on a substance like rubber as mineral acids like sulphuric and hydrochloric would have.

ENEMIES OF NEW PLANTATION RUBBER.

From Kalutara, Ceylon, comes the information that the white ant or termite, and a snail known as the "Kalutara snail" have been added to "bark-rot" as other enemies of plantation rubber in Ceylon.

Both the termite and the "Kalutara snail" attack the bark of the "tapping area" of rubber trees. They devour the bark to a considerable depth, but do not attack the cambium. The bark is left by them full of rough shallow cavities which spoil the tapping area. The ants cover these holes with their mud nests and build little "communication trench-like" channels leading down to their burrows in the ground. As thousands of insects contribute to the work these nests become very large, and it appears that tar applied to the attacked areas, after the destruction of the nests, is not sufficient to discourage the termites.

The most efficient method of checking the destructive work of these white ants has been to destroy their earthwork completely by pouring kerosene oil over it and setting it on fire.

The snails lay thousands of yellowish eggs, about the size of a pepper seed, which they conceal carefully at the foot of the trees on which they live. These eggs are frequently found 3 or 4 inches below the surface of the ground, in bunches of 10 to 15.

If not destroyed, these eggs hatch in a few days and tiny snails soon cover the trunk of the tree. At this stage it is an easy matter to destroy the newcomers, but once they scatter, it is almost impossible to exterminate all of them until they are large and have done considerable damage to the bark of the *Hevea* trees attacked. However, Ceylon planters are said to be successfully combating both ants and snails, which they do not consider as a very serious menace to their rubber plantations.

MEDAN RUBBER SALES.

The first sale of crude rubber under the auspices of the Medan Society for Products Trade was held in that city in September, when more than 12,000 pounds of rubber crêpe were sold at auction. These sales will continue and are to be arranged to coincide with the Java-New York steamship sailings.

RUBBER IN BRITISH NORTH BORNEO.

Rubber production in British North Borneo is increasing. The trees on estates planted five and six years ago are now ready for tapping and in various quarters large areas are being placed under cultivation.

Statistics for the year 1915, just published, show that exports of plantation rubber totaled $1,304,863, while exports of the wild sort amounted to only $1,908, compared with 1914, when the figures were $897,478 and $8,484 for plantation and wild rubber exports, respectively.

This gain of over $400,000 in the value of rubber exported is not only evidence of the progress of the industry, but of the prosperous condition of rubber estates generally. The exports of crude rubber from North Borneo to the United States, in which the plantation sort was alone represented, amounted to $10,489 in 1915, against $11,503 the previous year, showing a decrease of $1,014. This decline is not peculiar to the rubber industry, for statistics show a falling off in all exports to the United States direct, a tendency probably due to the shortage in shipping facilities.

The total exports of crude gutta percha amounted to $5,484 and $3,347 in 1915 and 1914, respectively.

RUBBER IN UGANDA.

The Department of Agriculture of British Uganda reports that *Hevea* rubber trees planted in 1906 are giving fair results considering the high altitude (4,500 feet) of the Kakumiro plantation where they are growing and the fact that early neglect has allowed a species of couch-grass (*Lumbugu*) to establish itself among the roots. Seed collected from the trees has been sown in nurseries and has also been distributed to various parts of the protectorate.

Manihot, planted in July, 1912, at the Kakumiro plantation, has made good growth and many of the trees were ready for tapping in 1915. Some trees planted in June, 1912, were tapped heavily during December, 1914, and January, 1915, as they were of irregular growth and it was intended to remove them. The number of trees tapped was 65, with an average girth of 19 inches at a height of three feet from the ground. They were tapped 24 times, and yielded 110 ounces of dry rubber. The flow of latex was then but small and the trees therefore were rested with a view of tapping again at a later date. (Further details on the rubber industry in Uganda were given on page 148 of the December 1915 issue of THE INDIA RUBBER WORLD.)

RUBBER AND BALATA IN BRITISH GUIANA.

The Department of Lands and Mines of British Guiana has just issued a report on mining and agriculture in the colony, covering the period from April 1 to December 31, 1915, a change having been made in the financial year to coincide with the calendar year. The financial year heretofore ended March 31.

The quantity of balata exported during the nine months was 1,188,807 pounds, which was 41,394 pounds in excess of the total production for the preceding 12 months.

Rubber exports during the nine months amounted to 3,778 pounds, against 1,932 pounds during the financial year 1914-1915. All was collected from *Hevea Brasiliensis* trees on private properties. The estimated area under rubber at the end of the year was 4,687 acres.

While at present the output of rubber from these plantations is of little importance, the production in the future will show a rapid advance as the trees now planted come into bearing, the climate and the soil being very favorable to *Hevea* trees.

Recent Patents Relating to Rubber.

THE UNITED STATES.

ISSUED OCTOBER 17, 1916.

No. 1,201,252. Sectional pneumatic tire. R. E. Campbell, Columbia, S. C.

1,201,256. Bath-tub mat. W. H. Clarke, Los Angeles, Calif.

1,201,257. Tire fabric with wire warp threads. H. Z. Cobb, Winchester, Mass., assignor to Revere Rubber Co., Providence, R. I.

1,201,282. Tire casing. G. F. Fisher, Plainfield, N. J., assignor to Morgan & Wright, Detroit, Mich.

1,201,307. One-piece waterproof diaper. I. M. Joseph, assignor to S. H. Shoninger—both of Chicago, Ill.

1,201,340. Pneumatic tire. W. M. Peabody, Chicago, Ill.

1,201,495. Cushion-tire. H. Paine, O. A. Widerberg and P. R. Johnson, Worcester, Mass.

1,201,551. Rim for vehicle wheels. R. S. Bryant, assignor to The Standard Welding Co.—both of Cleveland, Ohio.

1,201,556. Life saving suit having a collapsible air chamber adapted to inflation. J. Chlumsky, Chicago, Ill.

1,201,744. Multiple-serpentine-tread tire. F. W. Kremer, Carlstadt, N. J.

1,201,747. Collapsible rim for automobile tires. H. L. Lenherr and W. A. Lenherr, Mercersburg, Pa.

1,201,767. Massage apparatus comprising a cup-shaped soft rubber member. L. Schimek and P. Becker, Chicago, Ill.

1,201,808. Teat cup for milking machines. L. Dinesen, assignor to Perfection Manufacturing Co.—both of Minneapolis, Minn.

1,201,854. Locking mechanism for vehicle wheel rims. H. Mote, Detroit, Mich.

1,201,859. Tire comprising a casing, a metal band, and a hard rubber inclosure in which the band is embedded and secured by vulcanization. M. J. Napier, Detroit, Mich.

1,201,951. A feed bar for fountain pens. W. I. Ferris, Westfield, N. J., assignor to L. E. Waterman Co., New York City.

1,202,000. Tire shoe. W. W. McMahan, Detroit, Mich., and R. B. Price, New York City, assignors to Morgan & Wright, Detroit, Mich.

ISSUED OCTOBER 24, 1916.

1,202,188. Locking device for demountable automobile wheel rims and the like. F. D. Hiller, Jr., Webster Groves, assignor to Hil-Ko Rim Lock Co., St. Louis—both in Missouri.

1,202,197. Life preserver. J. W. Lippincott, assignor of one-half to C. A. Lippincott—both of Little Rock, Ark.

1,202,200. Armor for pneumatic tires. A. L. McNaghten, Aberdeen, S. D.

1,202,206. Rim for pneumatic tires. F. H. Moyer, Euclid Heights Village, Ohio.

1,202,207. Life preserver comprising an inflatable tube and a gas bag. K. Nebel, Chicago, Ill.

1,202,245. Enema bag and nozzle. G. U. Tompers, Brooklyn, N. Y.

1,202,295. Maternity corset, the front end section of which consists of elastic fabric. C. Leo, Boston, Mass.

1,202,318. Playing ball. F. T. Roberts, Trenton, N. J.

1,202,322. Cushion heel for shoes. W. M. Scholl, Chicago, Ill.

1,202,383. Golf club head. H. V. Hardman, assignor to The Hardright Co.—both of Belleville, N. J.

1,202,390. Protector for pneumatic tires. F. H. Ihlenburg, New York City.

1,202,441. Protective automobile mat. C. W. Small, Malden, Mass.

1,202,490. Golf ball. C. Davis, U. S. Navy, and F. Kniffen, Wilmington, Del.; said Kniffen assignor to said Davis.

1,202,604. Double tube pneumatic tire. M. S. Stevenson, London, England.

1,202,668. Abdominal supporter comprising an elastic panel. M. E. Byrd, Mount Winans, Md.

1,202,695. Inner tube with ends flattened and connected by snap fasteners. F. Fenton, assignor to The Miller Rubber Co.—both of Akron, Ohio.

1,202,717. Necktie having a lining of sheet rubber. W. Hey, York, assignor to H. Goldstein & Co., Limited, London—both in England.

1,202,725. Tire protector. I. Karpen, Chicago, Ill.

1,202,726. Tire protector. I. Karpen, Chicago, Ill.

1,202,732. Cushion heel. T. B. Keogh, New York City, assignor of one-fourth to F. P. Auwell, Brooklyn, N. Y., and one-fourth to N. P. Wedin, Jersey City, N. J.

1,202,738. Life preserving apparel. J. Klucina, Cicero, Ill.

1,202,740. A nursing bottle and nipple having a marginal portion fitting on the top. H. P. Kraft, Ridgewood, N. J.

ISSUED OCTOBER 31, 1916.

1,202,820. Rubber heel. E. J. Emery, Portsmouth, N. H.

1,202,827. Ventilated boot or shoe. A. Gerhold, London, England.

1,202,845. Wheel rim. F. F. Hultgreen, South Berkeley, Calif.

1,202,855. Tire bead. F. W. Kremer, Carlstadt, N. J.

1,202,877. Anesthesia apparatus. B. Morgan, Chicago, assignor to W. F. Clark, Oak Park—both in Illinois.

1,202,898. Tire casing with internal springs. A. C. Salter, Bartow, Ga.

1,202,919. Pneumatic tire. J. D. Tew, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.

1,202,968. Pneumatic tire shoe. I. W. Cole, Plainfield, N. J.

1,202,991. Pneumatic tire. J. Girard, Montreal, Quebec, Canada.

1,202,993. Hose coupling. E. H. Gold, Chicago, Ill.

1,203,020. Corset with elastic gores. J. Leopold and M. Beberfeld, New York City.

1,203,134. Wheel rim. J. T. Ronald, Seattle, Wash.

1,203,160. Rubber-covered garter button. A. T. Van Alstyn, New York City.

1,203,243. Antiskidding device for wheel tire. J. H. Myres and L. D. Snover, Waterford, Mich.

1,203,329. Stethoscope with rubber tubing. C. M. Heck, Raleigh, N. C.

1,203,458. Cushion block tire. T. Barnes, Denver, Colo.

ISSUED NOVEMBER 7, 1916.

1,203,570. Rubber key top for typewriters. R. E. Beaubien, Chicago, Ill.

1,203,648. Solid tire attachment. M. C. Overman, New York City.

1,203,654. Inner tube. L. R. Schaap, Longmont, Colo.

1,203,762. Gasket comprising metal and rubber. C. I. E. Mastin, Midland Park, N. J.

1,203,898. Pneumatic cushion wheel. O. Mussinan, New York City.

1,203,910. Vehicle tire. A. J. Savage, assignor to the Savage Tire Co.—both of San Diego, Calif.

1,203,915. Tire with rubber tread and cork body. E. Schmitt, New York City.

1,203,985. Pneumatic tire armor. S. T. Culp, Littleton, Colo.

1,204,007. Packing for pump rods. B. W. Goodsell, Chicago, Ill.

1,204,010. Tire rim. E. Hopkinson, East Orange, N. J.

1,204,109. Tire casing with replaceable tread. O. Zarth, assignor of one-half to W. H. McCullouch—both of Aurora, Ill.

1,204,125. Bottle stopper and rubber dropper. E. J. Brosnan, Troy, N. Y.

1,204,237. Can for fountain or other syringes. E. H. Bickley, Pittsburgh, Pa.

1,204,293. Overshoe. C. W. MacWilliams, Geneva, Nebr.

1,204,352. Hose coupling. F. Hachmann, assignor of one-fourth to F. C. Schoenthaler—both of St. Louis, Mo.

1,204,365. Rubber boot. C. Lee, assignor to The Goodyear's Metallic Rubber Shoe Co.—both of Naugatuck, Conn.

DOMINION OF CANADA.

ISSUED AUGUST 31, 1916.

171,134. Demountable rim. H. J. Trares, Edwardsville, and A. S. Winey, Mishawaka, assignee of a half interest—both in Illinois.

171,184. Anti-slipping device for tires. I. C. Hess, Emlenton, Pa.

171,208. Nipple. M. H. McMann, New York City.

171,273. Non-skid tire chains. W. B. Lasher, Bridgeport, Conn., assignee of H. B. Weed, Syracuse, N. Y.

171,276. Corset comprising a plurality of elastic strips. L. J. A. Amyot, Quebec City, Quebec, Canada.

171,396. Bust form comprising elastic bands. M. V. Heuchan, Los Angeles, Calif.

171,443. Cushion tire. The Estes Airless Tire Co., Newark, and M. E. Amonett, J. M. Amonett, and E. L. Amonett, West Orange, assignees of W. B. Estes, Newark—all in New Jersey.

171,444. Pneumatic tire with puncture proof plate. Gutta Percha & Rubber, Limited, Toronto, Ontario, Canada, assignee of C. C. Ferry, Middlebury Center, Pa.

171,461. Pneumatic tire casing. R. M. Merriman and A. Micheler, assignee of a half interest—both of Akron, Ohio.

171,462. Pneumatic tire with cushion tread. J. C. Markle and C. F. Nast, assignee of a half interest—both of Seattle, Wash.

171,469. Tire tread of rubber and blocks of rigid material. W. T. Bogan and W. W. Porter, assignee of a half interest—both of Philadelphia, Pa.

171,471. Pneumatic tire with partitioned tube. W. C. Cole and M. F. Stewart, assignees of a half interest—both of Coronation, Alberta, Canada.

171,475. Pneumatic tire and molded tube. H. C. Boggs, Decatur, Ala.

171,483. Pneumatic cord tire. C. L. Archer, Minneapolis, Minn.

171,509. Tire casing tube and rim. E. H. Herrick, New York City.

171,518. Pressure control for tires. E. B. Keith, Pontiac, Mich.

171,527. Tire liner. J. C. Mooney, Erie, Pa.

171,529. Pneumatic tire. W. D. McNaull, Toledo, Ohio.

171,532. Pneumatic tire with tread band comprising spirally coiled strands. L. R. Poschadel, Milwaukee, Wis.

171,536. Metal inner tube. W. F. Stewart, Pekin, Ill.

171,537. Solid tire and rim. W. E. Supernaw, Elgin, Ill.

171,585. Rubber glove. J. D. Garvey, Chicago, Ill.

171,598. Tire holder. C. L. Keyes, Peru, Ind.

171,653. Elastic waist band for garments. The Union Special Machine Co., Chicago, Ill., assignee of L. O. Bouchard, Philadelphia, Pa.

Chemical Patents will be found on pages 131-132. Machinery and Process Patents on pages 144-145.

THE UNITED KINGDOM.

PATENT SPECIFICATIONS PUBLISHED.

In order to give the public the advantage of having abridgments of specifications up to date while retaining their numerical sequence, applications for patents made subsequent to 1915 are given new numbers when their complete specifications are accepted, or become open to public inspection before acceptance. The new numbers start with No. 100,001 (without any indication of date), and supersede the original application numbers in all proceedings after acceptance of the complete specifications.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, OCTOBER 11, 1916.]

9,103 (1915). Combining damaged tire treads to form one good cover. J. B. Gay, 27 Alhambra avenue, Toronto, Ontario, Canada.

9,160 (1915). Elastic band for attaching a mirror to the head of a chauffeur, cyclcist, jockey, etc. S. H. Gollan, 9 Portchester Gate, London.

9,199 (1915). Teat cup for milking machine. J. Treloar, Victoria street, Hamilton, Auckland, New Zealand.

9,257 (1915). India rubber springs. R. T. Glascodine, 77 Canon street, London.

9,263 (1915). Spring wheel with a rubber and canvas tread band. T. Whitehead, Bela Grove, Blackpool, Lancashire.

9,286 (1915). A hollow heel for use on a shoe in which a layer of india rubber extends from toe to heel. E. Magaldi, 10 Via Visconti, Milan, Italy.

101,161. Spring wheel with pneumatic hub and rubber cushions. M. F. Kettler, Houston, Texas.

101,177. Pneumatic hub with rubber cushions. J. Greppi and A. Romanach, 1411 Sarmiento street, Buenos Aires.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, OCTOBER 18, 1916.]

17,751 (1914). Tire consisting of an elastic core covered by wire. P. E. H. Forsans, 10 Rue du Pont-Neuf, Brussels.

5,951 (1915). Heel breast burnishing tool composed in part of rubber. J. Gouldbourn, and British United Shoe Machinery Co., Union Works, Belgrave Road, Leicester; and E. Eaves, 33 Dorset street, Wolverhampton.

9,318 (1915). Wheel with solid rubber tire and pneumatic cushion. C. A. James, Prescott Terrace, Rose Park, and F. F. Milford, Portrush Road, Toorak—both in South Australia.

9,319 (1915). Improvement in diving suit valve. Neufeldt & Kuhnke, Werk Ravensberg am/Habsburger Ring, Kiel, Germany.

9,404 (1915). Cushion tire. A. S. Miesch, 40 Crompton Road, Handsworth, Birmingham.

9,435 (1915). Athletic blouse with elastic waist band. A. Perry, Behring House, Argyll Place, Regent street, London.

9,440 (1915). Tire built up of blocks of rubber and enclosed in a cover. E. J. Mitchell, 55 Harman street, Brooklyn, N. Y.

101,232. Toy in which pieces of elastic stretched on a frame produce a musical note when swung through the air. A. J. Herne, 41 Berners street, Oxford street, London.

101,241 Reservoir pens. D. Cameron, Waverley Works, Blair street, Edinburgh.

101,257. Hose coupling. G. J. Winter, 686 East Utica street, Buffalo, N. Y.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, OCTOBER 25, 1916.]

9,640 (1915.) Explosive shells comprising an inner packing of cork and rubber. P. Pomeon and J. Pomeon (trading as Pomeon et ses Fils, A.), Saint Chamona (Loire), France.

9,699 (1915.) Rubber rollers in apparatus for painting metal sheets. H. Folland, Brandeg, and W. Griffiths, 2 High street—both in Glamannan, Carmarthenshire.

9,737 (1915). Puncture repairing plug for pneumatic tires. F. Merricks, 5 Great Winchester street, London.

9,827 (1915). Elastic webbing used to accommodate a hat to heads of different sizes. F. E. English and M. G. Wiener, 1700 Washington avenue, St. Louis, Mo.

9,867 (1915). Tire inflating valve. H. S. Land, 75 Old Road, Lee, Kent.

101,294. Metal tread bands for pneumatic tires. T. Duysens, 21 Gubbelstraat, and R. Hustinx, 10 Spoorweglan—both in Maastricht, Holland.

101,317. Cushion tire. J. C. Anderson, Cochran Hotel, Fifteenth street, Washington, D. C.

101,320. Means employing rubber for retaining dentures in the mouth. G. E. Arnold, 67 West Hill street, St. Leonard's-on-Sea; H. H. Arnold, Northlands, Hollington, Hastings, and J. C. Arnold, 2 The Haven, Sandhurst Lane, Little Common—all in Sussex.

101,323. Inflated rubber lining for footwear and other wearing apparel. R. Harradine, Broad Street House, New Broad street, London.

101,328. Reservoir pens. C. H. Dunn, "Bank" House, Kew, Surrey.

101,341. Rubber pad device for cleaning safety razor blades. C. J. Kennedy and W. W. Blackshaw, 318 West Second street, Duluth, Minn.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, NOVEMBER 1, 1916.]

10,041 (1915). Puncture preventing metal band to be inserted between the air-tube and outer cover of a tire. J. G. Jorgensen, 1 Jyllandsgade, Horsens, Denmark.

10,082 (1915). An artificial ankle without joints, tendons or pivots comprising a rubber block. J. B. Hilliard, 157 Hope street, Glasgow.

10,132 (1915). Motor vehicle wheel with a flanged rim for use on rails, and a rim of lesser diameter on which a pneumatic tire is secured for use on ordinary roads. C. A. Dunham, 689 Asylum avenue, Hartford, Conn.

10,197 (1915). A rubber and canvas protective band for insertion between the air tube and cover of a wheel tire. R. W. David, 1340 Westmoreland street, Philadelphia, Pa.

10,220 (1915). Rubber in automatic vent valves. A. E. Bezant, 11 Leonard Road, Landport, Portsmouth.

10,232 (1915). Abdominal belt. P. A. E. Faure, 3 Rue Mirepoix, Toulouse, France.

101,353. An outer fabric cover for pneumatic tires. F. Duysens, 21 Gubbelstraat, and R. Hustinx, 10 Spoorweglan—both in Maastricht, Holland.

101,401. Horseshoe pad. T. Wood and M. Wood, 35 Mauldeth Road, Withington, Lancashire.

THE FRENCH REPUBLIC.

PATENTS ISSUED (With Dates of Application).

480,550 (December 14, 1915). Automatic life-belt with watertight compartments. T. Ingaramo.

480,580 (December 30, 1915). Cylindrical air-chamber closed by a press-button. Proust and Bonnin.

480,590 (April 16, 1915). Tread surface of wheel formed by supporting rubber cones. J. Spyker.

480,618 (October 19, 1914). Protective device for solid rubber and pneumatic tires. W. Ditzmann.

480,681 (January 13, 1916). Elastic wheel. J. Ollagnon.

480,716 (January 19, 1916). Improvements in pneumatic tires. M. J. Stevenson.

TRADE-MARKS.

THE UNITED STATES.

93,724. Representation of a swan-shaped automobile and chauffeur against a scenic background above the words SWANSON SUPPLY CO., on the automobile the word PARAGUM and below TRADE MARK—adhesive material used for repairing rubber goods, especially rubber tires. A. Swanson, Seattle, Wash.

94,010. Representation of a head and shoulders, and below the words LADY CLARE—dress-shields. Forbes & Wallace, Springfield, Mass.

95,440. The word DUNHAM—rubber linings, etc. The Dunham Mills, Inc., Hartford, Conn.

96,964. The word WALKONAIR—shoe heels. A. L. Runyan, Waterloo, Iowa.

97,112. The word HOPSIES—inflatable rubber toys, balls, balloons, etc. G. Borgfeldt & Co., New York City.

97,164. The words WHY NOT—golf balls. W. T. Henley's Telegraph Works Co., Limited, London Wall, London, England.

97,235. Two oval lines, one within the other, in the center the word CHARLOTTE, between the lines the words JONES' OFFICIAL SKATING BOOT—boots and shoes with rubber, felt and leather soles. George R. Jones Co., Manchester, N. H.

97,390. The word RIB-SKID—pneumatic rubber automobile tires. Beacon Tire Co., Inc., Beacon, N. Y

97,550. The word TEXTAN—soles composed partly of rubber, for boots and shoes. The B. F. Goodrich Co., New York City.

97,552. Two circles, one within the other, and across the center the representation of a shoe sole—soles composed partly of rubber for boots and shoes. The B. F. Goodrich Co., New York City.

97,576. The words WHY and NOT forming a circle around a mark of interrogation—golf balls. W. T. Henley's Telegraph Works Co., Limited, London Wall, London, England.

97,740. Representation of two medals, one on each side of the words GOLD MEDAL—elastic tapes. Samstag & Hilder Bros., New York City.

80,838. Representation of a rubber boot consisting of a narrow white band around the upper edge of the boot, and the body being of a contrasting color—rubber boots. The B. F. Goodrich Co., New York City, and Akron, Ohio.

80,839. Representation of a rubber boot consisting of a narrow green band around the upper edge of the boot, the body being of a contrasting color—rubber boots. The B. F. Goodrich Co., New York City, and Akron, Ohio.

80,840. Representation of a rubber boot consisting of a blue band around the upper edge of the boot, the body being of a contrasting color—rubber boots. The B. F. Goodrich Co., New York City, and Akron, Ohio.

96,845. The word PHYBUR—a rubber composition in the shape of soles and heels for shoes. The Manhattan Rubber Manufacturing Co., New York City.

96,846. The word PARANITE—belting made partly of rubber and partly of cotton. The Manhattan Rubber Manufacturing Co., New York City.

97,269. The word SAFETY—rubber gloves for domestic use. F. Chapman, Providence, R. I.

97,642. The words BLUE STEEL—rubber boots and shoes, overshoes, and rubber sole canvas shoes. Hood Rubber Co., Watertown, Mass.

97,932. The words FLINT ROCK—rubber overshoes and boots. Sears, Roebuck & Co., Chicago, Ill.

94,224. Representation of a wheel and pneumatic tire and in the center the word AUTIFI—tire fillers. The Autifi Co., San Francisco, Calif.

96,826. The word DELHI—belting, hose and machinery packing made partly of rubber and partly of cotton. The Manhattan Rubber Manufacturing Co., New York City.

96,830. The word FULTON—hose and machinery packing made partly of rubber and partly of cotton. The Manhattan Rubber Manufacturing Co., New York City.

96,939. The word KEDS—rubber, leather, and fabric boots and shoes. United States Rubber Co., New Brunswick, N. J.

97,391. The word BEACON—pneumatic rubber automatic tires. Beacon Tire Co., Inc., Beacon, N. Y.

97,496. The word BRONCHO—belting, hose, and packing. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,497. The word CINCINNATUS—belting, hose and packing. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,499. The word ARNO—belting, hose, packing and brake band lining. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,500. The word NORKA—belting, hose, packing, and fruit jar rings. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,501. The words OLD CROW—belting, hose, packing and fuller-balls. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,504. The word FIDELITY—belting, hose, packing, and fruit jar rings. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

97,597. The words PACE MAKER—belting and hose. The Cincinnati Rubber Manufacturing Co., Norwood, Ohio.

88,742. Picture of a man stepping over a boot, and the words WALK OVER—boots and shoes of rubber, etc. G. E. Keith Co., Brockton, Mass.

93,733. Representation of a piece of wire with two longitudinal ridges—insulated wire. Atlantic Insulated Wire & Cable Co., Jersey City, N. J.

94,741. The word GENERAL—rubber tires, tire casings, and inner tubes for pneumatic tires. The General Tire & Rubber Co., Akron, Ohio.

97,244. The word TATELEC—waterproofed fabric. Tate Electrolytic Water Proofing Co., Inc., New York City.

97,245. The word TATELEC—waterproofed threads and yarns. Tate Electrolytic Water Proofing Co., Inc., New York City.

97,978. The word PENSLAR—hot-water bottles and fountain-syringes. Peninsular Chemical Co., Detroit, Mich.

THE DOMINION OF CANADA.

21,920. Word OUTING in script type with a flourish beneath on which the words TRADE MARK appear, below being displayed the initials G. P. & R. LTD.—footwear constructed wholly or in part of rubber, rubberized fabrics or rubber substitutes. Gutta Percha & Rubber Limited, Toronto, Ontario.

21,922. The word AVON—types of india rubber. The Avon India Rubber Co., Limited, Rubber Works, Melksham, Wiltshire, England.

THE UNITED KINGDOM.

372,795. A blue flag with a white cross in its field, Chinese characters and the word EWO, their phonetic rendering in English—balata machine belting. Matheson & Co., Limited, London, E. C.

373,606. A drawing showing tires before and after being repaired, with the signature of Charles P. Salisbury, and the words BEFORE AND AFTER—vulcanized rubber tires and tubes and materials for repairing such tires and tubes. Salisbury's Tyre Repairing Co., Cardiff, Wales.

371,985. The drawing of a crab with the word CRABBE—rubber goods, including tires. Components, Limited, Birmingham.

372,725. The word CLINCHER—rubber substitute of vegetable composition. The North British Rubber Co., Limited, Edinburgh.

372,939. A label comprising a thistle, scales and swords, and the words DENTAL GOLDEN FLEECE RUBBER—vulcanite in sheets for forming plates of artificial teeth. The North British Rubber Co., Limited, Edinburgh.

373,438. The word MATTA—tires and tire treads, and goods of like kind, made of rubber. Pearson Brothers, Bournemouth.

373,446. The word WHIPPET—golf ball. A. S. Spalding & Bros., Limited, Putney, London, S. W.

373,776. The word SLEUTH—cycle and motor cycle tires of rubber. J. G. Graves, Limited, Sheffield, Yorkshire.

373,905. The word NICO—balata soles for boots and shoes. Norman Isherwood & Co., Bolton, Lancashire.

THE FRENCH REPUBLIC.

165,321. The word Cocorico—rubber tobacco pouches. Mathis, Paris.

165,379. The name LE FOURIER—military pouch for proofed material. Jeanne Mortagne, Paris.

165,400. The word FACTOR—rubber heels. Société Cousin et Cie., Levallois-Perret, Seine.

165,419. The number "520"—rubber tobacco pouches, suspenders, general rubber goods. Arnoux, Paris.

1,371. The word FLAMBEAU—rubber tobacco pouches. Cornoy-Vergnet, Saint-Claude, Jura.

1,372. The word TAMARIS— *Same.*

1,373. The word TRIANON— *Same.*

1,374. The words LA JUANITA— *Same.*

1,375. The word ORSAY— *Same.*

1,376. The word NELSON— *Same.*

1,377. The word MONTMARTE— *Same.*

1,378. The word MUSARDISE— *Same.*

1,379. The word OXFORD— *Same.*

1,380. The word TOURNOI— *Same.*

1,381. The word SOFT— *Same.*

24,085. The word FIRESTONE—all kinds of rubber goods. The Firestone Tire & Rubber Co., Akron, Ohio.

162,279. The word RUBY—rubber erasers. Léon Reboul, Paris.

162,280. The words ROYAL-DIAMANT— *Same.*

162,281. The words ROYAL RUBBER— *Same.*

162,282. The word PARA— *Same.*

162,283. The word NÉOLINE— *Same.*

162,713. The word PABLO—waterproofed garments. P. Duffo, Paris.

162,740. The words LE BLINDÉ—tires. François Delboye, Paris.

162,741. The word PHÉBUS—water-proofed sleeping bags. Leon Dupuis, Paris.

NEW ZEALAND.

13,356. The word RONOLEKE—water bottles, air and water beds, cushions, and pillows manufactured from india rubber. The Firm Trading as Sangers, 258 Euston Road, London, N. W., England.

13,380. The word HIPRESS—rubber boots and shoes. The B. F. Goodrich Co., New York City.

DESIGNS.

THE UNITED STATES.

49,763. Rubber brush. Term 14 years. Patented October 17, 1916. O. Eick, St. Louis, Mo.

49,764. Rubber brush. Term 14 years. Patented October 17, 1916. O. Eick, St. Louis, Mo.

49,797. Ornamental design for a sign or similar article. Term 14 years. Patented October 24, 1916. R. Griffith, Akron, Ohio.

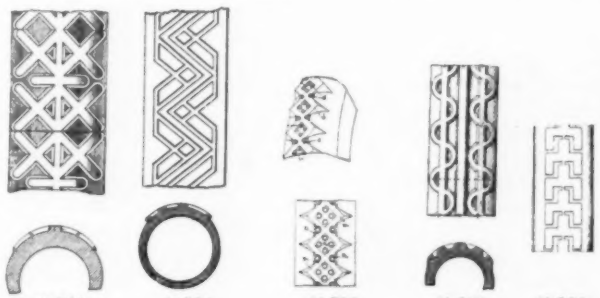
DESIGNS FOR TIRES.

UNITED STATES.

49,754. Vehicle tire. Term 3½ years. Patented October 17, 1916. E. P. Altenberg, East Palestine, Ohio.

49,786. Tire tread. Term 14 years. Patented October 17, 1916. W. S. Vorhis and V. A. Parker, Akron, Ohio, assignors to The B. F. Goodrich Co., New York City.

49,792. Vehicle tire. Term 14 years. Patented October 24, 1916. G. W. Beldam, Ealing, England.



49,754 49,786 49,792 49,811 49,836

49,811. Tire. Term 3½ years. Patented October 24, 1916. C. A. Westover, Youngstown, Ohio.

49,836. Vehicle tire. Term 14 years. Patented October 31, 1916. E. H. Trump, assignor to The Sebring Tire & Rubber Co.—both of Sebring, Ohio.

NEW TYPE OF DIRIGIBLE BALLOON.

The war has developed in Europe a new type of dirigible balloon which is being used in great numbers. This consists of what is practically an aeroplane body with its motor and propeller supported by a cigar-shaped gas bag made of rubberized fabric about 130 to 175 feet long and from 30 to 40 feet in diameter at its widest point; it has places for 4 passengers, carries fuel for 6 hours, can climb to an altitude of approximately 3,000 feet and has the ability to travel 60 miles per hour.

Naturally the radius of action of these small dirigibles is limited as compared with that of Zeppelins, but they are well suited to patroling at night when the use of aeroplanes is difficult, owing to the necessity to keep going while in the air and the dangers of landing at high speed in the dark.

Night is ideal for dirigibles, as the temperature is usually constant and not subject to fluctuations which occur in the day when the sun may shine at one moment and a little later be hidden by clouds, thus affecting the volume of gas in balloons and disturbing their equilibrium. At night a dirigible can navigate silently and keep sharp lookout for hostile machines.

The new type of dirigible here mentioned is widely used by the Entente Allies for sea patrol and has proved to be very useful for detecting submarines and for general harbor and navigation defense work. The fabric of the supporting part is both gas and waterproof, and the machines can be anchored in the open or housed in comparatively small sheds.

It appears that balloons of this type might be successful in this country for both military and pleasure purposes. They are said to cost about 60,000 francs [$12,000], and for more than 18 months have been patroling the English Channel, collaborating with destroyers in protecting the troops traffic between England and France.

Review of the Crude Rubber Market.

NEW YORK.

THE upward trend in the market that commenced late in October has continued through November, and prices have steadily advanced. All grades of crude rubber have been in good demand, which is believed to emanate from the manufacturers, although dealers' transactions have been equally active. That the market will experience the same violent fluctuations that commenced a year ago this month and ended December 30, in dollar rubber, is wholly speculative. Such disturbances are harmful to the trade in general and experience will doubtless caution the large interests in controlling the market.

Actual information concerning the restriction of London permits is not obtainable, but shipments from that port for some reason have been delayed.

On November 1, Upriver fine, spot, sold in a firm market for 63 to 63⅛ cents; Smoked sheet ribbed, spot, 63 cents; Amber light, spot, 60 cents, and Upriver fine, spot, was firm at 83 cents. As the month progressed the cabled reports of London's firm position were reflected in the New York market and prices continued upward. The volume of business gradually increased and toward the end of the month trading was quite lively. Spot quotations on November 27 were as follows: First latex, 70 cents; Smoked sheet ribbed, 70 cents, and light Amber, 68½ cents. Para sorts were easier, with Upriver fine at 81 and Upriver coarse at 47½ cents. There was little difference in plantation spot and future prices, and the producers refuse to sell at present levels. It is reported that forward sales are smaller for 1917 than any previous year.

LONDON.

Market conditions, generally, have been firm during the past month with periods of marked activity and fluctuations that have finally resulted in higher price levels. The loss of the "Arabia," early in the month, with 350 tons of rubber on board, had a tendency to support the advancing market. Supplies have not been plentiful, due, possibly, to restricted permits at Singapore and lack of cargo space, and while the London stocks on November 1 were 10,000 tons, the government's requirements of at least 5,000 tons must be taken into consideration. Moreover, England's crude rubber consumption is sure to increase under the proposed plan of industrial expansion now being propagated.

London imports for October were 3,835 tons, against 6,000 tons for September. Liverpool imports for October were 1,143 tons, against 1,160 tons for September.

SINGAPORE.

By mail advices we learn that the export restrictions have had the effect of reducing prices on this market and available supplies were bought up by the dealers. The strong demand for forward positions that followed was met with refusal on the part of the planting companies to sell at artificially depressed prices.

The result of the auctions held November 3, 10, 20 and 25 was as follows: Pale crêpe averaged 62.0 cents and Smoked sheet 60.3 cents, showing an average gain during the month of 7.8 cents for Pale crêpe and 6.7 cents for Smoked sheet. The amount sold was 1,827 tons, as compared to 2,555 tons a month ago.

BATAVIA.

There was good demand for all grades of plantation rubber at the November auctions with pale crêpe leading. Considerable spot rubber was sold in an advancing market. Futures were very dull due to the apathy of the producers. Later in the month the market became very active and prices advanced.

NEW YORK QUOTATIONS.

Following are the quotations at New York one year ago, one month ago, and November 28, the current date:

PARA.	Dec. 1, 1915.	Nov. 1, 1916.	Nov. 28, 1916.
Upriver, fine, new	68 @	81 @	78 @80
Upriver, fine, old	69 @	.....	.....
Islands, fine, new	65 @	72 @	71 @
Islands, fine, old	.....	.....	.....
Upriver, coarse, new	58 @	47 @	50 @
Upriver, coarse, old	.....	.....	.....
Islands, coarse, new	33 @	31½@	31 @32
Islands, coarse, old	.....	.....	.....
Cametá	35 @	32 @	32 @33
Caucho, ball, upper	58 @	47½@	50½@51
Caucho, ball, lower	56 @	44 @45	47 @49
PLANTATION.			
First latex crêpe	{ Spot.. 75 @ { Afloat	{ Spot... 63½@ { Futures 63½@	73 @ 73 @
Amber crêpe, light		{ Spot... 60 @ { Futures 60 @	71 @ 71 @
Brown crêpe, clean		{ Spot... 58 @ { Futures 58 @	68 @ 68 @
Smoked sheet, ribbed	{ Spot.. 75 @ { Afloat	{ Spot... 63 @ { Futures 63 @63¼	73 @ 73 @
Fine sheets and biscuits, unsmoked	....	.....	.....
CENTRALS.			
Corinto	52 @53	45 @	47½@
Esmeralda, sausage	54 @55	44 @	47 @
Nicaragua, scrap	53 @55	43½@	46½@47
Mexican plantation, sheet	.....	45 @	49 @50
Mexican, scrap	53½@54	42 @	45 @46
Mexican, slab	....	33 @	33 @34
Manicoba	....	32 @36	45 @
Mangabeira, sheet	36 @39	31 @37	40 @
Guayule	33 @35	33 @35	37 @39
Balata, sheet	56 @58	69 @	74 @
Balata, block	45 @46	61 @	65 @65½
AFRICAN.			
Lopori, ball, prime	65 @	55 @56	62 @63
Lopori, strip, prime	....	55 @56	.....
Upper Congo, ball, red	....	54 @	.....
Rio Nunez Niggers	63 @64	55½@56	63 @64
Conakry Niggers	60 @61	55½@56	58 @60
Massai, red	....	54½@55	55 @57
Soudan, Niggers	....	.....	.....
Cameroon, ball, soft	....	40 @	.....
Cameroon, ball, hard	....	46 @48	.....
Benguela, No. 2 Superior	39 @40	39 @	40 @41
Benguela, No. 2	....	42½@	39 @
Accra, flake	35 @37	33 @	23 @
EAST INDIAN.			
Assam	50 @54	41 @	49 @
Pontianak	6¾@ 7	8½@	8¼@
Gutta Siak	11¾@12	13 @	16 @
Gutta red Niger	....	26½@	27½@
Borneo III	....	....	....
Gutta Percha, red Macassa	1.85@2.00	1.88@	1.88@2.00

MARKET CABLE SERVICE FROM LONDON.

The following market report has been cabled from Aldens' Successors, Limited, London:

Date.	Standard Crêpe.	Smoked Sheet.	Market.
October 30 ..... *cents*	59.4	59.4	There were buyers.
November 6	61.8	59.4	There were buyers.
November 13	62.8	62.3	There were buyers.
November 20	63.3	63.3	There were buyers.

MARKET CABLE SERVICE FROM SINGAPORE.

The following reports of the weekly auctions held at Singapore have been cabled by The Waterhouse Co., Limited:

Date:	Crêpe. Price per lb.	Smoked Sheet. Price per lb.	Pounds Sold.	Market.
Nov. 3..*cents*	59.0	53.6	1,002,480	Good demand for all descriptions, prices advancing.
Nov. 10.....	62.4	62.0	1,016,960	Good demand for all descriptions.
Nov. 20.....	62.0	59.9	862,400	Dull; supplies are large.
Nov. 25.....	65.0	62.0	1,200,640	Very active.

COMPARATIVE NEW YORK PRICES FOR OCTOBER.

In regard to the financial situation, Albert B. Beers (broker in crude rubber and commercial paper, No. 68 William street, New York) advises as follows:

There is practically no change to report in the Commercial Paper market for November from the conditions prevailing in October, the demand having continued good, with the best rubber names selling at 4@4½ per cent, and those not so well known 4½@5 per cent, and some 5½ per cent.

	1916.*	1915.	1914.
Upriver, fine	$0.79@0.83	$0.57@0.76	$0.63@0.71
Upriver, coarse	.45@ .47	.44@ .62	.46@ .53
Islands, fine	.69@ .72	.54@ .67	.50@ .61
Islands, coarse	.30@ .32	.27@ .34	.27@ .32
Cametá	.32@ .33	.29@ .36	.29@ .34

*Figured only to November 25.

SINGAPORE.

GUTHRIE & CO., LIMITED, Singapore, report [October 5, 1916]:

A strong demand was again experienced when the sale was resumed this morning. Standard sheet sold up to $124, an increase of $1 from yesterday's best. Standard crêpe was unchanged. Medium and lower grade crêpes were if anything slightly higher and all parcels sold readily. Of 654 tons offered 456 tons changed hands. The following was the course of values:

	In Singapore per picul.*	Sterling equivalent per pound in London.	Equivalent per pound in cents.†
Sheet, fine ribbed smoked	$120@124	2/ 4¼@2/ 5½	58.28@59.80
Sheet, good ribbed smoked	116@120	2/ 3⅞@2/ 4¼	56.50@58.28
Sheet, plain smoked	105@118	2/ 1½@2/ 4¼	51.70@57.27
Sheet, ribbed unsmoked	109@113	2/ 2⅛@2/ 3¼	53.46@55.24
Sheet, plain unsmoked	105@110	2/ 1½@2/ 2⅝	51.70@53.97
Crêpe, fine pale	124@125	2/ 5½@2/ 5¾	59.80@60.31
Crêpe, good pale	117@124	2/ 4⅛@2/ 5½	57.01@59.80
Crêpe, fine brown	116@119	2/ 3⅞@2/ 4½	56.50@57.77
Crêpe, good brown	107@115	2/ 2 @2/ 3⅝	52.70@56.00
Crêpe, dark	90@110	1/10¾@2/ 2⅝	45.35@53.46
Crêpe, bark	57@104	1/ 3½@2/ 1⅜	31.42@51.43
Scrap, virgin	73@ 94	1/ 6⅞@1/11¼	38.26@47.13
Scrap, pressed	82@...	1/ 8¾@.....	42.06@.....
Scrap, loose	50@ 89	1/ 2 @1/10⅞	28.38@46.37

* Picul = 133⅓ pounds.

† Figured at standard rate of exchange, 1*s.* = 24.3 cents.

Quoted in S. S. dollars = 2/4 [56.7 cents].

PLANTATION RUBBER FROM THE FAR EAST.

TOTAL EXPORTS FROM MALAYA.

(From January 1, 1916, to dates named. Reported by Barlow & Co., Singapore. These figures include the production of the Federated Malay States, but not of Ceylon.)

To—	From Singapore. August 31, 1916.	From Malacca. August. 31, 1916.	From Penang. August 31, 1916.	From Port Swettenham. September 11, 1916.	Totals.
United Kingdom. *lbs.*	20,358,178	4,639,630	15,494,701	20,679,766	61,172,275
The Continent	7,584,882	.....	51,200	.....	7,636,082
Japan	2,607,293	.....	.....	.....	2,607,293
Ceylon	581,619	.....	413,733	1,178,941	2,174,293
United States	54,263,194	.....	7,428,133	1,301,867	62,993,194
Australia	233,081	.....	.....	.....	233,081
Totals	85,628,247	4,639,630	23,387,767	23,160,574	136,816,218
For same period, 1915	48,334,291	5,346,805	18,184,930	21,276,328	93,142,354
For same period, 1914	25,420,119	3,234,581	13,801,332	20,637,311	63,093,343
For same period, 1913	16,353,430	.....	9,939,467	19,946,488	46,239,385

EXPORTS OF CEYLON GROWN RUBBER.

(From January 1 to October 9, 1915 and 1916. Compiled by the Ceylon Chamber of Commerce.)

To—	1915.	1916.
United States *pounds*	11,736,404	20,200,638
Canada and Newfoundland	384,940	6,720
France	379,872	1,299,994
Russia	332,200	248,874
Italy	.....	15,680
United Kingdom	18,561,024	16,404,892
Australia	621,977	756,361
India	1,000	1,358
Straits Settlements	119,933	43,680
Japan	245,211	256,789
Totals	32,382,561	39,234,976

(Same period 1914, 25,744,812 pounds; same period 1913, 19,161,808.) The export figures of rubber, given in the above table for 1914, include the imports re-exported. (These amount to 2,410,071 pounds from the Straits Settlements and 572,684 pounds from India.) To arrive at the total quantity of Ceylon rubber exported for that year deduct these imports from the total exports. The figures for 1915 and 1916 are for Ceylon rubber only.

FEDERATED MALAY STATES RUBBER EXPORTS.

An official cablegram from Kuala Lumpur gives the figures of the export of plantation rubber from the Federated Malay States during the month of October as 5,968 tons against 6,376 tons in the previous month and 4,120 tons in the corresponding month last year. This gives a total of 50,270 tons for ten months of the current year against 34,777 tons in 1915 and 24,447 tons in 1914. Appended are the comparative figures:

	1914.	1915.	1916.
January *tons*	2,542	3,473	4,471
February	2,364	3,411	5,207
March	2,418	3,418	4,429
April	2,151	2,777	3,914
May	2,069	2,708	3,956
June	2,306	3,403	5,114
July	2,971	3,687	5,053
August	1,850	3,796	5,782
September	2,879	3,984	6,376
October	2,897	4,120	5,968
Totals	24,447	34,777	50,270

STRAITS SETTLEMENTS RUBBER EXPORTS.

An official cablegram from Singapore gives the figures of the export of plantation rubber from Straits Settlements ports during the month of September as 2,987 tons against 3,246 tons in August last and 4,725 tons in the corresponding month last year. This gives a total of 34,951 tons for nine months of the current year against 24,953 tons in 1915 and 13,017 tons in 1914. The following are the comparative figures:

	1914.	1915.	1916.
January *tons*	1,181	2,576	4,443
February	1,703	2,741	3,359
March	1,285	2,477	4,481
April	1,548	1,978	4,219
May	1,309	3,588	3,274
June	1,480	2,249	3,836
July	1,584	2,324	5,106
August	1,325	2,295	3,246
September	1,602	4,725	2,987
Totals	13,017	24,953	34,951

These figures include transhipments of rubber from various places in the neighborhood of the Straits Settlements such as Borneo, Java, Sumatra and the non-Federated Malay States as well as rubber actually exported from the Colony, but *do not include* rubber exports from the Federated Malay States.

IMPORTS AND EXPORTS OF RUBBER AND GUTTA AT SINGAPORE

IMPORTS.

From—	September, 1916. Para Rubber.	Para Rubber for Treatment.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
Malay Peninsula—					
Port Swettenham. *pounds*	1,680,266	.....	.....	.....	.....
Teluk Anson	1,063,866	.....	.....	.....	.....
Penang	685,733	1,866	.....	.....	.....
Muar	669,936	4,533	.....	.....	.....
Malacca	411,566	734,133	.....	.....	.....
Port Dickson	130,133	.....	.....	.....	.....
Kelantan	123,866	13,066	.....	.....	.....
Kuantan	39,200	.....	.....	.....	.....
Rengat	34,533	27,333	.....	.....	.....
S. Pandjang	3,200	.....	.....	.....	.....
Mersing	533	.....	.....	.....	.....
Tringganu	133	.....	.....	.....	.....
Totals	4,842,965	780,931	.....	.....	.....
Borneo—					
Sarawak	128,533	24,933	2,000	1,866	554,600
Pontianak	100,466	6,133	6,933	5,066	5,600
Bandjermassin	59,200	32,800	3,600	6,000	16,133
Sambas	57,633	.....	.....	666	27,533
Labuan	40,666	12,800	.....	5,466	70,333
Jesselton	33,200	252,000	266	3,466	.....
Sandakan	30,266	44,400	.....	.....	.....
Sibu	24,823	.....	933	2,266	52,533
Passir	20,400	.....	.....	.....	.....
Kudat	4,666	59,733	.....	533	.....
Singkawang	4,000	.....	.....	.....	.....
Sampit	2,000	.....	666	7,266	234,666
Samarinda	666	.....	2,133	2,146	.....
Totals	506,519	432,799	16,531	34,741	961,398
Sumatra—					
Djambi	330,133	.....	.....	.....	.....
Deli	84,666	370,266	.....	.....	.....
Asahan	62,666	.....	.....	.....	.....
Belawan	16,000	136,933	.....	.....	.....
Indraghiri	14,266	8,133	.....	.....	.....
Palembang	7,733	.....	266	.....	328,666
Siak	6,930	.....	.....	.....	.....
Muntok	5,466	.....	.....	.....	.....
Port Bon	2,666	.....	2,666	4,266	66,666
Bengkalis	2,133	.....	.....	.....	.....
Totals	532,659	515,332	2,932	4,266	395,332

September, 1916.

From—	Para Rubber.	Para-Rubber for Treatment.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
Java—					
Java—					
Sourabaya	197,066	.....	.....	.....	.....
Batavia	124,666	.....	.....	.....	.....
Totals	321,732	.....	.....	.....	.....
Siam—					
Bangkok	1,066	.....	.....	.....	.....
Patani	666	.....	.....	.....	.....
Totals	1,732	.....	.....	.....	.....
Burma—					
Rangoon	15,063	.....	.....	.....	.....
Mergui	3,600	.....	.....	.....	.....
Totals	18,663	.....	.....	.....	.....
Ceylon—					
Colombo	43,733	.....	.....	.....	.....
Other ports	262,400	248,533	8,533	13,733	83,733
Grand Totals	6,530,403	1,997,595	37,996	52,740	1,440,463

EXPORTS.

September, 1916.

To—	Para Rubber Para.	Trans-shipped.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
NORTH AMERICA:					
United States—					
Akron ..... *pounds*	3,160,400	150,666	.....	.....	.....
New York	3,062,666	231,733	.....	118,000	206,933
Seattle	1,032,866	42,933	.....	.....	.....
San Francisco	4,000	.....	.....	.....	.....
Totals	7,259,932	425,332	.....	118,000	206,933
EUROPE:					
United Kingdom—					
England—					
London	1,528,533	363,066	.....	79,200	36,666
Liverpool	133,333	261,066	.....	.....	233,866
Russia (Vladivostok)	1,244,266	.....	.....	.....	.....
Italy (Genoa)	33,600	26,933	.....	.....	.....
France (Marseilles)	11,200	.....	.....	.....	.....
Totals	2,950,932	651,065	.....	79,200	270,532
Grand Totals	10,210,864	1,076,397	.....	197,200	477,465

EXPORTS OF INDIA RUBBER FROM MANAOS DURING SEPTEMBER, 1916.

EXPORTERS.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
Suter & Co. ..... *kilos*	20,911	4,160	10,243	6	44,320	59,918	387	2,601	47,343	110,249	154,569
General Rubber Co. of Brazil	47,918	4,089	17,354	639	70,000	161,390	16,104	4,354	63,152	245,000	315,000
Tancredo Porto & Co.	101,326	14,972	17,903	1,903	136,104	68,545	16,992	409	12,054	98,000	234,104
Adelbert H. Alden, Ltd.	3,743	8,568	6,788	170	19,269	44,433	10	18	15,516	59,977	79,246
Armazens Andresen	34,091	945	5,243	7,560	47,839	.....	.....	.....	.....	.....	47,839
T. G. Araujo	8,640	2,764	4,111	.....	15,515	15,840	.....	.....	.....	15,840	31,355
Ohliger & Co.	14,479	1,384	5,675	7,031	28,569	.....	.....	.....	.....	.....	28,569
E. Strassberger & Co.	18,398	.....	4,675	5,491	28,564	.....	.....	.....	.....	.....	28,564
Amorim Irmaos	.....	.....	.....	.....	.....	1,120	.....	880	.....	2,000	2,000
W. Peters & Co.	830	.....	775	230	1,835	.....	.....	.....	.....	.....	1,835
Theodore Levy, Camille & Co.	.....	.....	.....	.....	.....	.....	.....	811	560	1,371	1,371
Mesquita & Co.	.....	.....	.....	.....	.....	.....	320	640	.....	960	960
Vianna Hudrade & Co.	.....	.....	.....	155	155	.....	.....	.....	.....	.....	155
Totals, September, 1916	259,336	36,882	72,767	23,185	392,170	351,246	33,813	9,713	138,625	533,397	925,567
August, 1916	435,992	47,117	84,672	24,754	592,535	272,281	20,604	10,127	258,293	561,305	1,153,840
July, 1916	238,014	21,593	31,284	204,740	495,631	68,650	43,932	18,914	269,029	400,525	896,150
January to June, 1916	2,537,504	410,024	996,427	1,438,355	5,382,310	1,450,817	313,896	242,475	1,240,885	3,248,073	8,630,383

(Compiled by Suter & Co., Manaos.)

EXPORTS OF INDIA RUBBER FROM PARA AND MANAOS DURING SEPTEMBER, 1916.

EXPORTERS.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
J. Marques ..... *kilos*	346,173	30,931	83,078	31,303	491,485	5,510	.....	5,940	8,636	20,086	511,571
General Rubber Co. of Brazil	1,360	3,130	60,030	670	65,190	127,481	3,570	.....	7,525	138,576	203,766
Suter & Co.	20,726	4,066	28,881	291	53,964	61,234	302	7,590	11,806	80,932	134,896
Pires Teixeira & Co.	22,100	2,678	47,861	5,280	77,919	28,345	.....	.....	.....	28,345	106,264
Suarez Hermanos & Co., Ltd.	41,569	.....	2,189	3,856	47,614	16,438	.....	.....	7,938	24,376	71,990
Adelbert H. Alden, Ltd.	170	3,394	4,923	.....	8,487	33,754	.....	.....	1,012	34,766	43,253
Sundries	19,137	.....	9,240	8,909	37,286	8,814	1,148	505	17,764	28,231	65,517
	451,235	44,199	236,202	50,309	781,945	281,576	5,020	14,035	54,681	355,312	1,137,257
Exports from Itacoatiara	.....	.....	.....	.....	.....	6,840	480	4,050	170	11,540	11,540
Exports from Manaos	417,779	46,490	93,003	25,033	582,305	351,246	33,813	9,713	138,625	533,397	1,115,702
Totals	869,014	90,689	329,205	75,342	1,364,250	639,662	39,313	27,798	193,476	900,249	2,264,499

(Compiled by Suter & Co., Para.)

CRUDE RUBBER ARRIVALS AT THE PORT OF NEW YORK.

[The Figures Indicate Weights in Pounds.]

NOVEMBER 3.—By the steamer *Stephen* from Para and Manáos:

	Fine.	Medium.	Coarse.	Caucho.	Totals.
Meyer & Brown	98,400	25,100	66,500	14,300=	204,300
Davies, Turner & Co.	795,700	29,500	130,000	128,000=	1,083,200
Arnold & Zeiss	155,100	7,100	33,100	100=	195,400
Henderson & Korn	.....	25,400	56,800	86,000=	168,200
H. A. Astlett & Co.	38,000	36,700	74,600	2,900=	152,200
Aldens' Successors, Ltd.	17,000	14,000	30,500	.....=	61,500
Paul Bertuch	37,400	.....	20,800	.....=	58,200
Hagemeyer & Brunn	32,500	2,100	19,800	.....=	54,400
General Rubber Co.	.....	.....	44,500	.....=	44,500
Robinson & Co.	29,900	1,600	11,700	.....=	43,200
Pell & Dumont	.....	.....	23,100	.....=	23,100
F. D. Duerr & Co.	3,100	.....	.....	11,700=	14,800
Totals	1,207,100	141,500	511,400	243,000=	2,103,000

NOVEMBER 10.—By the steamer *Sergipe* from Para:

Meyer & Brown	8,600	1,100	46,300	.....=	56,000
Davies, Turner & Co.	214,200	12,800	11,300	10,500=	248,800
H. A. Astlett & Co.	2,500	.....	61,600	.....=	64,100
Neuss, Hesslein & Co.	41,300	.....	.....	8,800=	50,100
Hagemeyer & Brunn	29,900	8,000	7,200	700=	45,800
G. Amsinck & Co.	11,300	1,300	4,200	28,400=	45,200
Henderson & Korn	10,700	1,100	16,500	13,800=	42,100
Muller, Schall & Co.	34,500	2,400	3,700	700=	41,300
Aldens' Successors, Ltd.	400	1,200	31,000	.....=	32,600
Arnold & Zeiss	.....	.....	22,600	.....=	22,600
General Rubber Co.	.....	.....	22,500	.....=	22,500
Paul Bertuch	15,000	1,400	.....	.....=	16,400
W. R. Grace & Co.	.....	.....	11,300	.....=	11,300
Various	3,700	.....	1,500	2,400=	7,600
Totals	372,100	29,300	239,700	65,300=	706,400

NOVEMBER 13.—By the steamer *Atahualpa* from Para and Manáos:

Meyer & Brown	46,800	4,700	11,600	.....=	63,100
Davies, Turner & Co.	292,800	6,600	20,500	4,400=	324,300
Aldens' Successors, Ltd.	41,000	9,000	35,500	.....=	85,500
Henderson & Korn	15,000	1,800	46,200	.....=	63,000
Arnold & Zeiss	39,200	2,300	13,300	.....=	54,800
H. A. Astlett & Co.	1,800	4,100	30,300	3,200=	39,400
W. R. Grace & Co.	27,800	.....	.....	10,600=	38,400
Robinson & Co.	.....	12,400	19,500	.....=	31,900
General Rubber Co.	.....	.....	22,500	.....=	22,500
Pell & Dumont	.....	.....	12,000	.....=	12,000
Totals	464,400	40,900	211,400	18,200=	734,900

POUNDS.

PARAS.

NOVEMBER 1.—By the *Cristobal*=Colon:

G. Amsinck & Co. (Fine)	7,000	
G. Amsinck & Co. (Coarse)	2,000	
G. Amsinck & Co. (Caucho)	1,500	
Mecke & Co. (Caucho)	20,000	30,500

NOVEMBER 8.—By the *Carpathia*=Liverpool:

Arnold & Zeiss (Coarse)		45,000

CENTRALS.

[*This sign, in connection with imports of Centrals, denotes Guayule rubber.]

OCTOBER 20.—By the *Santa Marta*=Cartagena:

G. Amsinck & Co.	4,500	
R. del Castillo & Co.	1,000	
H. Wolff & Co.	1,000	6,500

OCTOBER 24.—By the *Metapan*=Port Limon:

Isaac Brandon & Bros.	1,000	
A. A. Linde & Co.	1,000	2,000

OCTOBER 25.—By the *Van Hogendorp*=Guayaquil:

Andean Trading Co.		20,000

OCTOBER 26.—By the *Almirante*=Cartagena:

G. Amsinck & Co.	3,000	
American Trading Co.	1,500	
De Lima, Cortissoz & Co.	5,000	
Andean Trading Co.	1,000	
H. Wolff & Co.	500	11,000

NOVEMBER 1.—By the *Panama*=Colon:

G. Amsinck & Co.	5,100	
A. M. Capen's Sons	8,700	
Mecke & Co.	3,600	
Pablo Calvet & Co.	2,000	19,400

NOVEMBER 1.—By the *Cristobal*=Colon:

G. Amsinck & Co.	21,200	
Pablo Calvet & Co.	27,500	
Lawrence Johnson & Co.	19,500	
Mecke & Co.	3,000	
W. R. Grace & Co.	8,500	
Pottberg, Ebeling & Co.	1,500	
Isaac Brandon & Bros.	2,000	
Dumarest Bros.	3,600	
J. S. Sembrada & Co.	1,000	
Alpers & Merritt	6,300	94,100

NOVEMBER 6.—By the *Saramacca*=Barrios:

A. Rosenthal & Sons	2,500	
W. R. Grace & Co.	1,200	
G. Amsinck & Co.	500	4,200

NOVEMBER 8.—By the *Calamares*=Port Limon:

Isaac Brandon & Bros.		1,000

NOVEMBER 10.—By the *Carrillo*=Colombia:

G. Amsinck & Co.		2,000

NOVEMBER 13.—By the *Guantanamo*=Mexico:

G. Amsinck & Co.	3,500	
American Trading Co.	22,000	
Harburger & Stack	2,500	
H. Marquardt & Co.	200	
Various	4,000	32,200

NOVEMBER 14.—By the *Tenadores*=Port Limon:

Isaac Brandon & Bros.	600	
H. Marquardt & Co.	200	
Stark & Co.	200	1,000

NOVEMBER 14.—By the *Colon*=Colon:

Piza, Nephews & Co.	4,000	
Fidanque Bros. & Co.	1,000	5,000

NOVEMBER 15.—By the *Esperanza*=Mexico:

General Export & Commission Co.	600	
Graham, Hinkley & Co.	600	
C. Tennant, Sons & Co.	*45,000	
U. S. Brokerage	400	46,600

AFRICANS.

OCTOBER 21.—By the *Veendyk*=Batavia:

General Rubber Co.	60,000	
Karl Schroeder	20,000	80,000

OCTOBER 23.—By the *Kroonland*=Liverpool:

Goodyear Tire & Rubber Co.	16,000	
Fred. Stern & Co.	4,000	20,000

OCTOBER 23.—By the *Laconia*=Liverpool:

Meyer & Brown		5,000

OCTOBER 24.—By the *Galileo*=Hull:

Arnold & Zeiss	12,000	
Fred. Stern & Co.	8,000	20,000

POUNDS.

NOVEMBER 1.—By the *La Rance*=Bordeaux:

Robert Badenhop Co., Inc.		22,500

NOVEMBER 3.—By the *Foyle*=London:

Robert Badenhop Co., Inc.	1,500	
L. Littlejohn & Co.	6,470	7,970

NOVEMBER 3.—By the *Roepat*=Batavia:

General Rubber Co.		320,000

NOVEMBER 6.—By the *Baltic*=Liverpool:

Rubber Trading Co.		4,500

NOVEMBER 6.—By the *St. Louis*=Liverpool:

Goodyear Tire & Rubber Co.		22,500

NOVEMBER 6.—By the *Gogsja*=Lisbon:

Various		60,000

NOVEMBER 8.—By the *Saxonia*=Liverpool:

Fred. Stern & Co.	11,000	
Rubber Trading Co.	22,400	33,400

NOVEMBER 8.—By the *Carpathia*=Liverpool:

Rubber Trading Co.	22,000	
J. T. Johnstone & Co.	3,000	25,000

NOVEMBER 16.—By the *Andania*=London:

L. Littlejohn & Co.		33,500

NOVEMBER 18.—By the *Cedric*=Liverpool:

Robert Badenhop & Co., Inc.		4,500

MANICOBAS.

OCTOBER 25.—By the *Cuthbert*=Pernambuco:

G. Amsinck & Co.		2,000

NOVEMBER 3.—By the *Stephen*=Ceara:

Various		125,000

NOVEMBER 3.—By the *Eastern Prince*=Bahia:

Charles T. Wilson Co., Inc.		3,000

NOVEMBER 10.—By the *Sergipe*=Pernambuco:

Lawrence Johnson & Co.		20,000

NOVEMBER 11.—By the *Tocantins*=Bahia:

Adolph Hirsch & Co.		26,000

PLANTATIONS.

OCTOBER 21.—By the *Michigan*=London:

Rubber Trading Co.	18,000	
Fred. Stern & Co.	130,000	
Goodyear Tire & Rubber Co.	45,000	193,000

OCTOBER 21.—By the *Veendyk*=Batavia:

G. Amsinck & Co.	170,000	
General Rubber Co.	340,000	
J. T. Johnstone & Co.	467,000	
Edward Maurer & Co., Inc.	270,000	
Firestone Tire & Rubber Co.	60,000	
Manhattan Rubber Manufacturing Co.	65,000	
W. R. Grace & Co.	22,500	
Jooster & Jansen	13,500	
Henderson & Korn	22,500	
T. Gierdams	9,000	
L. Littlejohn & Co.	34,800	
Stein, Hirsch & Co.	11,000	
Goodyear Tire & Rubber Co.	60,000	
Various	290,000	1,833,300

OCTOBER 23.—By the *Valeria*=Liverpool:

Fred. Stern & Co.		5,000

OCTOBER 25.—By the *Kathlamba*=Colombo:

Meyer & Brown	440,000	
L. Littlejohn & Co.	315,820	
Arnold & Zeiss	95,000	
W. H. Stiles & Co.	100,000	
Charles T. Wilson Co., Inc.	17,000	
Aldens' Successors, Ltd.	11,200	
Henderson & Korn	40,000	
Robinson & Co.	70,000	
Goodyear Tire & Rubber Co.	75,000	
J. T. Johnstone & Co.	33,670	
Edward Maurer & Co., Inc.	13,000	
Various	100,000	1,310,690

POUNDS.

OCTOBER 26.—By the *Mesaba*=London:

Meyer & Brown	170,000	
Raw Products Co.	11,000	
L. Littlejohn & Co.	10,080	
Edward Maurer & Co., Inc.	30,000	
Charles T. Wilson Co., Inc.	90,000	
G. R. Henke	11,000	322,080

OCTOBER 27.—By the *Mongolia*=London:

Rubber Trading Co.	145,600	
Fred. Stern & Co.	80,000	
Michelin Tire Co.	45,000	
L. Littlejohn & Co.	116,756	
Charles T. Wilson Co., Inc.	70,000	457,356

OCTOBER 30.—By the *Headley*=London:

Arnold & Zeiss	240,000	
Aldens' Successors, Ltd.	273,000	
L. Littlejohn & Co.	225,582	
B. F. Goodrich Co.	33,000	
Robinson & Co.	60,000	
J. T. Johnstone & Co.	44,800	
Hagemeyer Trading Co.	25,000	
Raw Products Co.	9,000	
Henderson & Korn	7,000	
Edward Maurer & Co., Inc.	4,500	
W. R. Grace & Co.	1,500	923,382

NOVEMBER 3.—By the *Foyle*=London:

Meyer & Brown	70,000	
Arnold & Zeiss	115,000	
General Rubber Co.	80,000	
The B. F. Goodrich Co.	70,000	
Michelin Tire Co.	50,000	
Robinson & Co.	80,000	
Hagemeyer Trading Co.	4,500	
Edward Maurer & Co., Inc.	33,000	
Various	60,000	562,500

NOVEMBER 3.—By the *Roepat*=Batavia:

Meyer & Brown	100,000	
Arnold & Zeiss	60,000	
General Rubber Co.	50,000	
East Asiatic Co.	40,000	
Manhattan Rubber Mfg. Co.	90,000	
Edward Maurer & Co., Inc.	13,500	
Goodyear Tire & Rubber Co.	260,000	
Stein, Hirsch & Co.	50,000	
Fred. Stern & Co.	7,000	
W. R. Grace & Co.	4,500	
I. W. Phyfe & Co.	22,500	
Joosten & Janssen	9,000	
L. Littlejohn & Co.	193,217	
Charles T. Wilson Co., Inc.	11,200	
Aldens' Successors, Ltd.	9,000	
Robinson & Co.	22,500	
Rubber Trading Co.	4,500	
G. Amsinck & Co.	315,000	
Henderson & Korn	90,000	
J. T. Johnstone & Co.	112,000	
Various	400,000	1,863,917

NOVEMBER 4.—By the *Kasama*=Colombo:

Meyer & Brown	280,000	
Goodyear Tire & Rubber Co.	17,000	
Henderson & Korn	40,000	
L. Littlejohn & Co.	317,890	
Arnold & Zeiss	115,000	
J. T. Johnstone & Co.	47,040	
Edward Maurer & Co., Inc.	2,200	
Various	18,000	837,130

NOVEMBER 6.—By the *Baltic*=Liverpool:

Rubber Trading Co.		22,000

NOVEMBER 8.—By the *Saxonia*=Liverpool:

The B. F. Goodrich Co.		11,000

NOVEMBER 13.—By the *Manchuria*=London:

Meyer & Brown	50,000	
Edward Maurer & Co., Inc.	135,000	
L. Littlejohn & Co.	354,252	
Charles T. Wilson Co., Inc.	45,000	
G. R. Henke	22,500	
Rubber Trading Co.	112,000	
Fred. Stern & Co.	20,000	738,752

NOVEMBER 16.—By the *Andania*=London:

Meyer & Brown	67,000	
Edward Maurer & Co., Inc.	180,000	
W. H. Stiles & Co.	13,500	
Hagemeyer Trading Co.	22,500	
Aldens' Successors, Ltd.	571,600	
The B. F. Goodrich Co.	336,000	
Michelin Tire Co.	85,000	
Robinson & Co.	80,000	
Charles T. Wilson Co., Inc.	50,000	
L. Littlejohn & Co.	38,000	1,443,600

NOVEMBER 18.—By the *Manhattan*=London:

Meyer & Brown	70,000	
Goodyear Tire & Rubber Co.	95,000	
Fred. Stern & Co.	40,000	
Rubber Trading Co.	11,000	216,000

CRUDE RUBBER ARRIVALS AT SEATTLE.

Consignee is given first, followed by shippers. Figured 130 pounds net to the case.

PLANTATION.

	Pounds.	
TO AKRON.		
OCTOBER 28.—by the steamer *Tamba Maru.*		
Firestone Tire & Rubber Co.		
The Waterhouse Co.	176,150	
TO SAN FRANCISCO.		
NOVEMBER 11.—By the steamer *Shidzuoka Maru.*		
Mitsui & Co.		
Mitsui Bussan Kaisha	26,130	
TO SEATTLE.		
W. R. Grace & Co.		
R. T. Reid & Co.	1,820	
TO AKRON.		
NOVEMBER 13.—By the steamer *Hawaii Maru.*		
Firestone Tire & Rubber Co.		
The Waterhouse Co.	229,320	
Goodyear Tire & Rubber Co.		
Wadleigh & Co.	122,070	351,390
TO AKRON.		
NOVEMBER 14.—By the steamer *Inaba Maru.*		
Firestone Tire & Rubber Co.		
The Waterhouse Co.	161,070	
Goodyear Tire & Rubber Co.		
Wadleigh & Co.	104,390	
Nippon Yusen Kaisha.		
Nippon Yusen Kaisha (Seattle)	38,220	303,680
TO AKRON.		
NOVEMBER 16.—By the steamer *Ixion.*		
Goodyear Tire & Rubber Co.		
Harrisons & Crosfield	253,630	
Wadleigh & Co.	218,920	
Anglo Malay Rubber Co.	33,540	
Rubber Estates of Johore	22,880	
Duff Development Co.	15,340	
Anglo Sumatra Rubber Co.	5,200	549,510
TO NEW YORK.		
United States Rubber Co.		
General Rubber Co.	65,000	
Arnold & Zeiss.		
Planters Stores & Agency Co	9,100	
Rembau Estate	4,940	
Cicely Rubber Estate Co.	4,420	
Gloucester Rubber Estates	2,080	
East Asiatic Co.		
Kualanal Kelanton Rubber Co.	4,290	
Duff Development Co.	2,990	
Kuala Pahi Rubber Estate	2,730	
L. Littlejohn & Co.		
Kuala Pahi Rubber Estate	2,730	98,280
TO SEATTLE.		
Goodyear Tire & Rubber Co.		
C. W. Mackie & Co.	65,000	
Sandilands Buttery & Co.	34,450	
Planters Stores & Agency Co.	3,380	
W. R. Grace & Co.		
The Devituarai Rubber & Tea Estates Co.	12,480	
Carson & Co.	11,180	
The Rose Laugh Tea & Rubber Co.	8,710	
The Ulu Rantan Rubber Estate Co.	4,550	
Sandilands Buttery & Co.	4,160	
Glensheil Rubber Estate Co.	2,470	
Cheras Rubber Co.	2,470	
Sungei Purun Rubber Co.	2,470	
R. T. Reid & Co.	1,950	
Arnold & Zeiss.		
Third Mile Rubber Co.	4,550	
Tangga Batu Rubber Co.	1,950	159,770

CUSTOM HOUSE STATISTICS.

PORT OF SAN FRANCISCO—SEPTEMBER, 1916.

IMPORTS:	POUNDS.	VALUE.
India rubber	435,776	$237,810
Gutta jelutong (Pontianak)	28,390	861
Rubber scrap	2,050	33
Manufactures of india rubber		301
Totals	466,216	$239,005
EXPORTS:		
Reclaimed rubber	5,958	$566
India rubber boots....*pairs*	19,078	16,725
India rubber shoes....*pairs*	236	872
Automobile tires		95,325
Other tires		16,969
Belting, hose, etc.		19,042
All other manufactures of india rubber		36,713
Total		$186,212

PORT OF BOSTON—OCTOBER, 1916.

IMPORTS:		
India rubber	99,165	$56,180
Rubber scrap	108,155	5,661
Manufactures of india rubber		2,037
Totals	207,320	$63,878
EXPORTS:		
Reclaimed rubber	40,611	$6,700
India rubber boots....*pairs*	31,466	64,419
India rubber shoes....*pairs*	53,915	17,826
Automobile tires		1,374
Belting, hose, etc.		1,520
All other manufactures of india rubber		8,064
Total		$99,903

PORT OF CHICAGO—OCTOBER, 1916.

IMPORTS:	
Manufactures of india rubber	$96

PORT OF CLEVELAND—OCTOBER, 1916.

IMPORTS:		
India rubber	899,556	$481,907
Rubber scrap	71	27
Manufactures of india rubber		560
Totals	899,627	$482,494
EXPORTS:		
Manufactures of india rubber		$195

DISTRICT OF MICHIGAN—OCTOBER, 1916.

IMPORTS:	POUNDS.	VALUE.
Rubber scrap	60,000	$982
EXPORTS:		
Rubber scrap	19,287	$1,539
India rubber boots....*pairs*	4,888	11,095
India rubber shoes....*pairs*	240	205
Automobile tires		12,154
Other tires		10
Belting, hose, etc.		1,850
All other manufactures of india rubber		8,780
Total		$35,632

PORT OF NEW ORLEANS—OCTOBER, 1916.

IMPORTS:		
India rubber	16,897	$6,117

PORT OF NEW YORK—OCTOBER, 1916.

IMPORTS:		
India rubber	16,093,317	$8,552,085
Balata	335,778	182,944
Gutta percha	112,797	11,317
Gutta jelutong (Pontianak)	1,399,381	54,621
Manufactures of india rubber		22,870
Totals	17,941,273	$8,823,837
EXPORTS:		
India rubber	70,000	$71,282
Balata	36,702	18,144
Rubber scrap	101,473	23,299
Reclaimed rubber	106,858	15,098
India rubber boots....*pairs*	13,262	26,923
India rubber shoes....*pairs*	132,164	74,877
Automobile tires		506,435
Other tires		82,059
Belting, hose, etc.		201,203
All other manufactures of india rubber		360,581
Total		$1,379,901

PORT OF PHILADELPHIA—OCTOBER, 1916.

EXPORTS:		
India rubber shoes....*pairs*	5	$5
Automobile tires		18,689
Belting, hose, etc.		2,872
All other manufactures of india rubber		231
Total		$21,797

PORTS OF SEATTLE AND TACOMA—OCTOBER, 1916.

IMPORTS:	POUNDS.	VALUE.
India rubber	4,213,786	$1,997,781
Gutta jelutong (Pontianak)	31,655	1,380
Manufactures of india rubber		7
Totals	4,245,441	$1,999,168
EXPORTS:		
India rubber boots....*pairs*	287	$1,177
India rubber shoes....*pairs*	5,415	3,718
Automobile tires		42,293
Other tires		265
Belting, hose, etc.		2,735
All other manufactures of india rubber		5,143
Total		$55,331

RUBBER STATISTICS FOR FRANCE.

IMPORTS.

Unmanufactured—	Eight months ending August, 1916. Pounds.
Crude rubber:	
Bordeaux—	
From United States	67,540
England	3,055,360
Brazil	162,360
French Congo	27,940
Senegal	404,140
Other French West African colonies	2,054,140
Other countries	1,612,380
Total	7,383,860
Havre—	
From United States	618,640
England	4,869,480
Brazil	82,500
British India	10,560
French Congo	244,860
Other French West African colonies	31,680
Other countries	471,680
Total	6,329,400
Marseilles—	
From England	118,140
British India	2,458,060
Senegal	2,200
Other French West African colonies	56,760
Other countries	997,920
Total	3,633,080
Paris—	
From United States	43,120
England	2,672,780
Other countries	10,340
Total	2,726,240
Boulogne—	
From England	1,116,940
Other countries	220
Total	1,117,160
Dunkerque—	
From England	1,281,060
Other countries	440
Total	1,281,500
Other ports	4,400,000
Grand Total	26,871,240

EXPORTS.

UNMANUFACTURED—	
Crude rubber:	
From Bordeaux	409,420
Havre	279,840
Paris	28,380
Rouen	29,040
Dunkerque	105,160
Marseilles	12,100
Chambéry	1,800,700
Toulouse	228,140
Boulogne	3,300
Dieppe	10,340
Bellegarde	42,020
Nice	27,280
Belfort	1,320
Other Ports	999,680
Total	3,976,720

IMPORTS AND EXPORTS OF CRUDE AND MANUFACTURED RUBBER AT THE PORT OF NEW YORK.

IMPORTS.

Week Ending—	India Rubber. Pounds.	India Rubber. Value.	Scrap for Re-manufacture. Pounds.	Scrap for Re-manufacture. Value.	Balata. Pounds.	Balata. Value.	Gutta Percha. Pounds.	Gutta Percha. Value.	Gutta Jelutong. Pounds.	Gutta Jelutong. Value.
October 20, 1916	.....	$7,817*	.....	.....	.....	.....	.....	$20,627†	.....	.....
	2,292,762	1,129,142	134,968	$7,536	68,613	$31,089	112,797	11,317	654,757	$25,238
October 27, 1916	.....	1,703*	.....	.....	.....	.....	.....	.....	.....	.....
	3,535,593	2,021,996	105,679	15,253	88,536	41,183	.....	.....	61,457	2,081
November 3, 1916	.....	9,954*	.....	.....	.....	.....	.....	685†	.....	.....
	2,400,729	1,344,150	239,044	16,589	36,901	14,965	60	10	.....	.....
November 10, 1916	.....	5,839*	.....	.....	.....	.....	.....	.....	.....	.....
	5,891,267	2,663,656	216,043	14,744	189,462	118,578	2,644	272	.....	.....
November 17, 1916	.....	3,964*	.....	.....	.....	.....	.....	.....	.....	.....
	3,885,625	1,981,389	185,077	9,937	24,011	9,571	2,644	272	79,462	2,575

In addition to the above, 723 pounds of chicle was imported from Mexico, valued at $164.

* Manufactures of India Rubber. † Manufactures of Gutta Percha.

EXPORTS.

FIGURES ISSUED FROM OCTOBER 25 TO NOVEMBER 24, 1916.

EXPORTED TO—	Belting, Hose and Packing.	Footwear. Boots.	Footwear. Shoes.	Tires. Auto.	Tires. Other.	Insulated Wire and Cables.	Other mnf. of India Rubber.	Fountain Pens.	Chewing Gum.	Reclaimed Rubber.	Scrap Rubber.
NORTH AMERICA:											
Bermuda	$135	.....	$414	.....	$174	$149	$638	$2	$185	.....	.....
British Honduras	44	.....	.....	.....	4	.....	7	.....	.....	.....	.....
Canada	.....	.....	.....	.....	.....	100	.....	.....	.....	.....	.....
Central American States—											
Costa Rica	853	.....	.....	$2,740	55	1,077	681	.....	142	.....	.....
Guatemala	1,177	.....	.....	635	86	583	661	.....	786	.....	.....
Honduras	81	.....	.....	1,708	165	187	247	6	12	.....	.....
Nicaragua	307	.....	.....	.....	.....	.....	702	.....	48	.....	.....
Panama	3,908	$86	5,586	7,249	2,083	17,079	4,119	393	4,059	.....	.....
Salvador	1,090	.....	.....	784	40	381	1,180	.....	305	.....	.....
Mexico	9,325	.....	690	9,640	16,167	14,026	4,243	1,033	210	.....	.....
Newfoundland	441	1,505	14,613	930	.....	2,463	3,300	3	676	.....	.....
West Indies—											
British—											
Barbados	.....	.....	26	959	.....	.....	72	.....	2	.....	.....
Jamaica	797	.....	259	5,401	216	682	1,040	4	59	.....	.....
Trinidad and Tobago	346	.....	1,185	4,058	93	572	1,240	.....	43	.....	.....
Other British	24	.....	993	3,977	494	.....	257	.....	6	.....	.....
Cuba	26,315	.....	3,808	51,051	9,950	48,272	31,360	776	1,958	.....	.....
Danish	74	.....	.....	170	78	5	114	.....	.....	.....	.....
Dutch	2	.....	13	460	28	1	206	2	.....	.....	.....
French	2	.....	382	776	408	.....	469	107	.....	.....	.....
Haiti	242	.....	33	241	82	104	722	8	3	.....	.....
Santo Domingo	818	.....	201	3,161	492	645	1,413	12	276	.....	.....
Totals, North America	$45,891	$2,391	$28,203	$93,940	$30,615	$87,225	$52,671	$2,340	$8,770	.....	.....
EUROPE:											
Azores Islands	.....	.....	.....	.....	.....	.....	$6	.....	.....	.....	.....
Denmark	$2,976	.....	$6,563	$915	$390	.....	25	.....	.....	.....	.....
France	1,333	$15,850	.....	40,049	609	$200,820	60,672	.....	$42,209	$3,619	.....
Greece	.....	.....	.....	.....	.....	260	340	.....	.....	.....	.....
Iceland	109	71	.....	.....	.....	250	300	.....	.....	.....	.....
Italy	111	3	4,260	3,201	5,821	574	9,726	$1,057	.....	.....	.....
Netherlands	1,386	.....	.....	.....	.....	9,931	6,131	.....	.....	.....	.....
Norway	5,927	.....	662	3,947	.....	21,731	1,577	100	221	.....	.....
Portugal	.....	.....	.....	3,673	.....	.....	.....	354	.....	.....	.....
Russia in Europe	.....	.....	.....	.....	.....	2,537	79	.....	.....	.....	.....
Spain	.....	.....	.....	15,601	.....	1,704	2,982	1,869	.....	.....	.....
Sweden	.....	.....	.....	.....	520	.....	4,377	.....	.....	.....	.....
Switzerland	.....	.....	459	.....	.....	271	7,877	.....	.....	.....	.....
United Kingdom—											
England	29,747	56,425	56,291	253,871	52,300	128,670	223,007	1,674	132,041	4,598	$23,014
Scotland	19,701	.....	77	.....	.....	77	1,474	.....	8,519	.....	.....
Totals, Europe	$61,290	$72,349	$68,312	$321,257	$59,540	$366,815	$318,633	$5,054	$182,990	$8,217	$23,014
SOUTH AMERICA:											
Argentina	$12,232	$11	$442	$115,532	$31,018	$20,235	$29,102	$8	$2,076	.....	.....
Bolivia	669	.....	.....	2,082	951	.....	340	.....	.....	.....	.....
Brazil	7,570	25	1,057	30,407	1,698	43,824	15,548	4	88	.....	.....
Chile	5,255	354	334	17,450	2,371	9,908	5,577	16	58	.....	.....
Colombia	427	.....	186	1,586	1,375	2,213	4,938	.....	.....	.....	.....
Ecuador	772	.....	.....	3,766	419	45	2,294	20	250	.....	.....
Guiana—British	533	.....	703	587	.....	.....	367	.....	.....	.....	.....
Dutch	7	.....	.....	154	56	.....	221	.....	.....	.....	.....
French	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	.....
Peru	3,335	656	16	1,065	333	10,322	3,282	.....	869	.....	.....
Uruguay	736	.....	15	11,561	2,858	15,784	3,103	.....	160	.....	.....
Venezuela	3,017	.....	107	13,117	1,430	1,451	4,055	18	139	.....	.....
Totals, South America	$34,553	$1,046	$2,860	$197,307	$42,509	$103,782	$69,833	$66	$3,640	.....	.....
ASIA:											
Aden	.....	.....	.....	$348	.....	.....	.....	.....	.....	.....	.....
China	$1,081	.....	.....	25	$26	$19,576	$927	.....	$126	.....	.....
British India	1,998	.....	$9	3,046	.....	1,904	7,008	$160	$130	.....	.....
Dutch East Indies	268	.....	.....	57,834	.....	13,838	2,221	.....	.....	.....	.....
Japan	1,064	.....	385	.....	.....	2,140	501	.....	.....	$1,198	$1,407
Korea	.....	.....	.....	.....	.....	.....	375	.....	27	.....	.....
Russia in Asia	143	.....	.....	.....	.....	.....	202	.....	.....	.....	.....
Totals, Asia	$4,554	.....	$394	$61,253	$26	$37,458	$11,234	$160	$293	$1,198	$1,407
OCEANIA:											
British—											
Australia and Tasmania	$239	.....	$5,550	$27,991	$5,914	$13,345	$8,353	.....	$1,766	.....	.....
British Oceania	.....	.....	.....	84	.....	.....	.....	.....	.....	.....	.....
New Zealand	141	.....	.....	4,018	1,204	162	1,020	$8	.....	.....	.....
Philippine Islands	922	.....	.....	.....	.....	317	964	.....	1,750	.....	.....
Totals, Oceania	$1,302	.....	$5,550	$32,093	$7,118	$13,824	$10,337	$8	$3,516	.....	.....
AFRICA:											
British Africa—											
West	.....	.....	.....	$2,039	$29	$1,054	$2	.....	.....	.....	.....
South	$42,956	.....	$1,289	31,415	2,348	11,235	16,555	$28	$890	.....	.....
East	93	.....	.....	1,771	1,350	.....	.....	.....	.....	.....	.....
Egypt	.....	.....	.....	.....	.....	.....	3	.....	3,384	.....	.....
Portuguese Africa	980	.....	.....	.....	.....	.....	56	.....	.....	.....	.....
Totals, Africa	$44,029	.....	$1,289	$35,225	$3,727	$12,289	$16,626	$28	$4,274	.....	.....

RUBBER STATISTICS FOR THE UNITED STATES.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
India rubber:				
From France	.....	.....	352,811	$236,921
Portugal	20,000	$7,200	1,200,590	540,655
United Kingdom	3,258,597	1,653,947	42,069,798	30,639,519
Central America and British Honduras	45,847	18,966	892,375	416,510
Mexico	54,020	22,256	2,127,792	873,708
Brazil	1,395,608	604,256	34,614,186	17,444,491
Other South America	843,450	386,894	4,359,928	2,133,635
East Indies	12,235,565	7,353,320	97,770,251	62,214,126
Other countries	8,401	4,466	527,284	404,383
Totals	17,861,488	$10,051,305	183,915,015	$114,903,948
Balata	204,256	103,164	1,603,893	664,905
Guayule gum	274,645	74,520	1,673,125	479,475
*Gutta jelutong	.....	.....	14,724,397	759,205
†Gutta jelutong	4,254,623	171,830	5,646,732	250,523
Gutta percha	632,079	72,243	2,774,645	299,999
Totals	23,227,091	$11,473,062	210,287,837	$117,358,055
Rubber scrap	1,279,622	99,749	10,563,404	852,033
Totals, unmanufactured	24,506,713	$11,572,811	220,851,241	$118,210,088
Chicle *dutiable*	599,488	$256,751	4,937,590	$2,088,995
MANUFACTURED—*dutiable:*				
Gutta percha	.....	$25,778	.....	$122,449
India rubber	.....	31,980	.....	305,654
Totals, manufactured	.....	$57,758	.....	$428,103
Substitutes—elasticon, etc	.....	$4,798	.....	$15,880

EXPORTS OF DOMESTIC MERCHANDISE.

MANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
Automobile tires:				
‡To Russia in Europe	.....	$14,668	.....	$883,197
England	.....	137,983	.....	4,711,563
Canada	.....	74,906	.....	675,391
Mexico	.....	11,879	.....	164,252
Cuba	.....	81,874	.....	483,127
Australia	.....	136,054	.....	1,430,063
New Zealand	.....	86,636	.....	865,876
Philippine Islands	.....	66,365	.....	346,242
Other countries	.....	314,553	.....	2,213,197
Totals	.....	$924,918	.....	$11,772,908
All other tires	.....	280,177	.....	2,020,868
Belting, hose and packing	.....	421,383	.....	2,501,623
Rubber boots *pairs*	21,029	44,303	326,273	733,895
Rubber shoes *pairs*	325,461	141,857	1,630,295	789,859
Scrap and old rubber	119,229	14,564	2,432,230	260,286
Reclaimed rubber	344,179	52,868	4,088,036	591,533
Other rubber manufactures	.....	917,033	.....	6,010,989
Totals, manufactured	.....	$2,797,103	.....	$24,681,961
Fountain pens *number*	20,667	$11,434	168,198	$94,353

EXPORTS OF FOREIGN MERCHANDISE.

UNMANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
Balata	129,823	$58,985	624,168	$235,618
Guayule gum	.....	.....	.....	.....
Gutta jelutong	.....	.....	56,000	2,520
Gutta percha	.....	.....	2,383	2,095
India rubber	320,224	167,087	4,109,545	2,563,679
Rubber scrap and refuse	.....	.....	.....	.....
Totals, unmanufactured	450,047	$226,072	4,792,096	$2,803,912
Chicle	8,406	$2,388	85,972	$29,346
MANUFACTURED—				
Gutta percha	.....	.....	.....	$352
India rubber	.....	$2	.....	31,616
Totals, manufactured	.....	$2	.....	$31,968

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES.

MANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
To Alaska:				
Belting, hose and packing	.....	$22,460	.....	$93,191
Boots and shoes *pairs*	17,755	44,457	62,538	168,109
Other rubber goods	.....	7,679	.....	33,016
Totals	.....	$74,596	.....	$294,316
To Hawaii:				
Belting, hose and packing	.....	$4,754	.....	$53,254
Automobile tires	.....	56,495	.....	374,604
Other tires	.....	7,122	.....	66,893
Other rubber goods	.....	13,759	.....	67,717
Totals	.....	$82,130	.....	$562,468
To Philippine Islands:				
Belting, hose and packing	.....	$3,451	.....	$42,829
Boots and shoes *pairs*	32,687	23,951	57,623	39,714
Tires	.....	88,965	.....	375,731
Other rubber goods	.....	4,573	.....	184,318
Totals	.....	$120,940	.....	$642,592
To Porto Rico:				
Belting, hose and packing	.....	$4,330	.....	$26,746
Automobile tires	.....	54,707	.....	326,827
Other tires	.....	844	.....	19,811
Other rubber goods	.....	9,076	.....	61,516
Totals	.....	$68,957	.....	$434,900

QUARTER ENDING JUNE 30, 1916.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	April 1, to June 30, 1916. Pounds.	Value.
Balata, crude	497,334	$206,824
Guayule gum	814,360	231,978
*Gutta jelutong	10,566,744	544,089
Gutta percha, crude	947,600	126,312
India rubber, crude	80,966,921	52,282,685
Scrap rubber	2,923,654	191,713
Reclaimed rubber	535,799	87,111
Totals, unmanufactured	97,252,412	$53,670,712
MANUFACTURED—*dutiable:*		
Gutta percha 10 per cent.	.....	$52,047
India rubber 10 per cent.	.....	116,379
Druggists' sundries of rubber 15 per cent.	.....	8,598
Hard rubber 25 per cent.	.....	5,990
Substitutes, elasticon, etc 15 per cent.	.....	1,770
Totals, manufactured	.....	$184,784
Chicle: Crude 15 cents per lb.	778,125	$234,149
Refined 20 cents per lb.	739,526	416,737
Totals	1,517,651	$835,670

*Free, January to June, 1916 (inclusive).
†Dutiable beginning July 1, 1916.
‡Not separately stated prior to January 1, 1916.

UNITED KINGDOM RUBBER STATISTICS.

IMPORTS.

UNMANUFACTURED—	September, 1916. Pounds.	September, 1916. Value.	Nine Months Ending September, 1916. Pounds.	Nine Months Ending September, 1916. Value.
Crude rubber:				
From Dutch East Indies	787,300	$522,100	7,846,300	$5,396,873
French West Africa	22,700	10,224	1,260,700	653,629
Gold Coast	58,400	21,049	1,261,100	502,529
Other countries in Africa	484,400	216,189	6,369,400	3,224,366
Peru	.....	.....	1,197,400	768,883
Brazil	1,568,400	854,157	17,906,600	11,636,454
British India	392,200	226,547	2,816,900	2,010,828
Straits Settlements and dependencies, including Labuan	3,710,600	1,818,182	35,797,500	24,819,641
Federated Malay States	6,449,500	4,030,540	30,294,000	20,584,924
Ceylon and dependencies	2,690,700	1,596,056	16,605,700	11,450,898
Other countries	442,000	260,157	2,451,400	1,616,115
Totals	16,606,200	$9,555,201	123,807,000	$82,665,140
Waste and reclaimed rubber	150,100	$16,065	4,334,000	$548,551
Gutta percha	277,800	133,675	5,108,000	2,317,196
MANUFACTURED—				
Apparel, waterproofed	.....	$962	.....	$51,582
Boots and shoes *dozen pairs*	23,143	125,892	169,345	1,363,780
Insulated wire	.....	42,278	.....	444,741
Submarine cables	.....	.....	.....	30,292
Automobile tires and tubes	.....	451,467	.....	9,223,850
Motorcycle tires and tubes	.....	39,394	.....	372,989
Cycle tires and tubes	.....	56,768	.....	427,043
Tires not specified	.....	1,485	.....	37,190

EXPORTS.

MANUFACTURED—	September, 1916. Pounds.	September, 1916. Value.	Nine Months Ending September, 1916. Pounds.	Nine Months Ending September, 1916. Value.
Apparel waterproofed:				
To France	.....	$27,213	.....	$298,447
British South Africa	.....	18,850	.....	146,515
British East Indies	.....	7,664	.....	115,855
Australia	.....	38,146	.....	249,246
New Zealand	.....	19,111	.....	147,318
Canada	.....	56,849	.....	292,156
Other countries	.....	133,371	.....	1,022,257
Totals	.....	$301,204	.....	$2,271,794
Boots and shoes *dozen pairs*	8,727	$57,496	80,331	$415,192
Insulated wire	.....	412,321	.....	2,056,571
Submarine cables	.....	52,603	.....	1,845,874
Automobile tires and tubes	.....	517,360	.....	4,483,115
Motorcycle tires and tubes	.....	44,839	.....	347,526
Cycle tires and tubes	.....	200,377	.....	2,471,180
Tires not specified	.....	111,670	.....	873,753
Manufactures not specified	.....	759,496	.....	6,049,841

EXPORTS—FOREIGN AND COLONIAL.

UNMANUFACTURED—	September, 1916. Pounds.	September, 1916. Value.	Nine Months Ending September, 1916. Pounds.	Nine Months Ending September, 1916. Value.
Crude rubber:				
To Russia	970,100	$605,377	9,562,500	$6,698,019
France	2,054,100	1,190,309	16,095,000	11,109,992
United States	2,718,600	1,512,528	42,783,700	30,939,134
Other countries	834,200	511,395	12,891,100	8,925,945
Totals	6,577,000	$3,819,609	81,332,300	$57,673,090
Waste and reclaimed rubber	4,200	$505	443,400	$76,334
Gutta percha	120,100	82,052	458,400	275,017
MANUFACTURED—				
Apparel, waterproofed	.....	$371	.....	$2,617
Boots and shoes..*dozen pairs*	4,000	23,719	23,535	135,478
Insulated wire	.....	5,769	.....	84,778
Automobile tires and tubes	.....	374,503	.....	3,237,399
Motorcycle tires and tubes	.....	5,731	.....	64,218
Cycle tires and tubes	.....	114	.....	111,075
Tires not specified	.....	1,823	.....	7,539

BRITISH CRUDE RUBBER STATISTICS.

IMPORTS.

UNMANUFACTURED—		1913.	1914.	1915.
Crude rubber:				
From Russia	*pounds*	7,643,700	3,234,400	.....
Germany		7,923,900	3,655,800	.....
German West Africa		421,600	142,400	138,500
German East Africa		556,200	205,600	2,700
Netherlands		1,073,200	472,500	2,800
Dutch East Indies		3,258,000	6,435,300	6,411,900
Dutch Guiana		898,600	.....	.....
Belgium		1,486,500	1,926,700	.....
Belgian Congo		15,400	668,200	4,979,300
France		6,916,800	3,500,800	176,000
French West Africa		2,261,000	629,000	1,623,400
French Somaliland		61,400	2,100	31,500
Madigascar		107,100	44,600	45,000
Portugal		30,100	193,000	805,500
Portuguese West Africa		110,600	168,200	196,800
Portuguese East Africa		230,500	57,200	133,300
Liberia		58,900	12,800	8,500
United States		4,191,300	3,024,800	598,100
Mexico		149,800	74,300	13,700
Colombia		84,700	6,900	4,200
Venezuela		95,400	3,100	4,400
Ecuador		11,400	2,700	700
Peru		2,913,300	1,552,300	1,658,200
Chile		1,800	7,500	.....
Brazil		36,359,500	27,743,300	28,639,100
Uruguay		890,800	828,600	119,900
Bolivia		54,000	139,300	717,300
Argentina		974,000	855,900	130,000
Other foreign countries		985,400	499,600	283,900
Totals from foreign countries		79,764,900	56,086,900	46,724,700
British West Africa:				
Gambia		15,300	3,400	1,000
Sierre Leone		16,600	13,800	1,100
Gold Coast		1,493,500	564,400	631,800
Nigeria		875,800	386,200	457,800
Natal		264,700	53,400	2,300
British East Africa:				
Zanzibar and Pemba		38,400	21,500	13,500
East Africa Protectorate		195,000	101,400	133,100
British India		1,965,500	2,596,500	3,288,800
Straits Settlements and dependencies including Labuan		33,831,300	47,359,900	66,053,200
Federated Malay States		22,130,400	21,999,100	28,880,300
Ceylon and dependencies		15,018,200	20,969,300	28,609,700
British Borneo		392,400	625,400	1,041,100
Other British possessions		1,441,900	738,400	207,200
Totals from British possessions		77,679,000	95,432,700	129,320,900
Grand Totals		157,443,900	151,519,600	176,045,600

RE-EXPORTS.

Crude rubber:				
To Russia		14,232,600	16,815,600	25,906,100
Sweden		973,800	841,600	1,380,600
Norway		138,500	70,600	519,600
Denmark		345,800	205,100	735,500
Germany		21,794,400	15,836,000	.....
Netherlands		2,750,800	1,907,100	162,800
Belgium		5,082,000	3,315,400	.....
France		11,890,800	11,057,300	15,209,700
Spain		146,800	271,900	284,700
Italy		587,800	1,521,500	8,597,000
Austria-Hungary		313,400	334,200	.....
Japan, including Formosa		438,600	217,300	474,200
United States		39,851,000	54,161,500	83,180,100
Other foreign countries		70,900	100,800	43,400
Totals to foreign countries		98,617,200	106,655,900	136,493,700
Australia:				
Victoria		1,170,300	1,018,000	805,500
Other colonies		53,200	25,700	28,900
Canada		985,700	2,221,100	4,949,100
Other British possessions		500	2,400	8,200
Total British possessions		2,209,700	3,267,200	5,791,700
Grand Totals		100,826,900	109,923,100	142,285,400

RUBBER STATISTICS FOR CANADA.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	August, 1916. Pounds.	August, 1916. Value.	Five Months Ending August, 1916. Pounds.	Five Months Ending August, 1916. Value.
Rubber and gutta percha, crude caoutchouc or india rubber:				
From Great Britain	277,000	$236,191	1,724,319	$1,264,398
United States	295,782	158,898	1,603,633	951,939
Straits Settlements	.....	.....	33,849	21,607
Other countries	.....	.....	2,217	1,891
Totals	572,782	$395,089	3,364,018	$2,239,835
Rubber, re-covered:				
From Great Britain	33,918	$1,231	64,137	$6,354
United States	333,388	50,694	1,845,866	262,500
Totals	367,306	$51,925	1,910,003	$268,854
Hard rubber, in sheets and rods:				
From United States	6,893	$4,354	14,294	$10,301
Rubber substitute:				
From United States	30,997	$2,739	251,255	$21,475
Rubber, powdered, and rubber or gutta percha waste:				
From Great Britain	.....	.....	81,052	$5,274
United States	38,152	$2,353	459,492	33,812
Other countries	1,607	146	5,882	334
Totals	39,759	$2,499	546,426	$39,420
Rubber thread, not covered:				
From United States	1,984	$2,996	17,329	$26,578
Balata, crude:				
From United States	.....	.....	4,774	$3,463
Chicle, crude:				
From United States	8,880	$2,656	174,569	$65,532
British Honduras	164,994	62,851	1,097,967	407,147
Mexico	137,933	58,268	334,727	156,345
Totals	311,807	$123,775	1,607,263	$629,024

MANUFACTURED—*dutiable:*	August, 1916. General Tariff Value.	August, 1916. Preferential Tariff Value.	Five Months Ending August, 1916. General Tariff Value.	Five Months Ending August, 1916. Preferential Tariff Value.
Boots and shoes:				
From Great Britain	.....	$2,544	.....	$3,480
United States	$10,292	.....	$41,719	.....
Totals	$10,292	$2,544	$41,719	$3,480
Belting:				
From Great Britain	.....	.....	.....	$247
United States	$8,134	.....	$23,673	.....
Totals	$8,134	.....	$23,673	$247
Waterproof clothing:				
From Great Britain	$400	$78,938	$547	$201,551
United States	25,903	.....	139,919	.....
Other countries	12	.....	12	.....
Totals	$26,315	$78,938	$140,478	$201,551
Hose, lined with rubber:				
From Great Britain	.....	$333	.....	$488
United States	$8,134	.....	$42,519	.....
Totals	$8,134	$333	$42,519	$488
Mats and matting:				
From Great Britain	.....	.....	.....	$66
United States	$120	.....	$1,750	.....
Totals	$120	.....	$1,750	$66
Packing:				
From Great Britain	$491	.....	$491	$405
United States	6,699	.....	36,540	.....
Other countries	.....	.....	4	.....
Totals	$7,190	.....	$37,035	$405
Tires of rubber for all vehicles:				
From Great Britain	.....	$564	$4,268	$9,833
United States	$96,704	.....	463,069	.....
France	339	.....	2,171	.....
Other countries	.....	.....	182	.....
Totals	$97,043	$564	$469,690	$9,833
*Rubber cement, and all other manufactures of india rubber and gutta percha, N. O. P.:				
From Great Britain	$174	$14,803	$1,159	$104,049
United States	69,236	.....	340,351	.....
Other countries	233	.....	639	.....
Totals	$69,643	$14,803	$342,149	$104,049
Hard rubber in tubes:				
From United States	$274	.....	$1,930	.....

Webbing—over one inch wide:				
From Great Britain	.....	$733	$22	$5,222
United States	$22,032	.....	104,454	.....
Other countries	65	.....	90	.....
Totals	$22,097	$733	$104,566	$5,222

*In addition, the imports of rubber cement and all manufactures of india rubber and gutta percha, not otherwise provided for, amounted to $9 from Great Britain and $1,428 from various countries for August; and $96 from Great Britain and $4,138 from various countries for the five months ending August, 1916, the values being at treaty rates.

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS.

	August, 1916.		Five Months Ending August, 1916.	
MANUFACTURED.	Produce of Canada. Value.	Reëxports of foreign Goods. Value.	Produce of Canada. Value.	Reëxports of foreign Goods. Value.
Belting:				
To Newfoundland	.....	.....	$1,734	.....
Hose:				
To Great Britain	$1,170	.....	$113,826	.....
United States	.....	$189	1,335	$314
Newfoundland	603	.....	2,116	.....
Other countries	944	.....	4,695	.....
Totals	$2,717	$189	$121,972	$314
Boots and shoes:				
To Great Britain	$62,914	.....	$230,108	.....
United States	.....	$36	87	$288
Newfoundland	7,014	.....	10,290	.....
Australia	4,456	.....	11,165	.....
New Zealand	1,375	.....	5,734	.....
Other countries	2,022	.....	5,651	.....
Totals	$77,781	$36	$263,035	$288
Clothing:				
To United States	.....	.....	.....	$57
Newfoundland	.....	.....	$578	.....
Totals	.....	.....	$578	$57
Tires:				
To Great Britain	$16,648	$354	$151,119	$354
United States	4,345	606	49,886	31,104
Newfoundland	1,704	.....	4,676	.....
Other countries	$4,627	.....	88,543	.....
Totals	$27,324	$960	$294,218	$31,458
*Rubber waste:				
To Great Britain	.....	.....	$14,078	.....
United States	$12,634	.....	75,113	.....
Totals	$12,634	.....	$89,191	.....
All other manufactures N. O. P.:				
To Great Britain	$7,265	.....	$33,940	.....
United States	945	$1,586	1,726	$5,124
Newfoundland	454	.....	1,604	.....
New Zealand	108	.....	451	.....
Other countries	339	.....	1,726	542
Totals	$9,111	$1,586	$39,447	$5,666
†Gum chicle:				
To United States	$188,693	$1,397	$730,156	$1,397
Other countries	.....	.....	1,704	.....
Totals	$188,693	$1,397	$731,860	$1,397

*During August 195,800 pounds of rubber waste was exported to the United States; making a total of 117,200 pounds to Great Britain and 1,110,800 pounds to the United States for the five months ending August, 1916.

†During August 316,804 pounds of gum chicle was exported to the United States; making a total of 2,250 pounds to various countries and 1,282,383 pounds to the United States for the five months ending August, 1916.

RUBBER STATISTICS FOR ITALY.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

	Seven Months Ending July, 1915.		Seven Months Ending July, 1916.	
UNMANUFACTURED—	Pounds.	Value.	Pounds.	Value.
India rubber and gutta percha —raw and reclaimed:				
From Great Britain	.....	.....	1,832,380	.....
Straits Settlements	1,942,600	.....	1,084,380	.....
African Fr. Colony	32,120	.....	6,380	.....
Belgian Congo	.....	.....	201,740	.....
Brazil	4,603,280	.....	3,265,460	.....
Other countries	464,860	.....	762,300	.....
Totals	7,042,860	$4,942,807	7,152,640	$5,019,853
Rubber scrap	802,340	$63,348	4,486,900	$354,261
MANUFACTURED—				
India rubber and gutta percha —threads:				
From United States	20,680	.....	31,900	.....
Great Britain	20,020	.....	20,240	.....
Other countries	2,200	.....	11,000	.....
Totals	42,900	$94,570	63,140	$110,782
India rubber and gutta percha —sheets:				
Cut sheets	1,760	$2,625	2,420	$3,609
Elastic fabric	3,300	1,303	220	87
Insulated wire	440	116	440	116
Hard rubber	7,700	5,404	27,060	18,991
India rubber and gutta percha —tubes:				
Cut sheets	880	$1,390	1,100	$1,737
Elastic fabric:				
From Austria-Hungary	880	.....	.....	.....
Germany	5,720	.....	.....	.....
Other countries	32,120	.....	4,840	.....
Totals	38,720	$20,381	4,840	$2,548
Other forms	2,420	$1,486	3,080	$1,891
Belting	41,140	$25,264	78,100	$47,961
Rubber coated fabrics...*pieces*	56,980	$69,982	82,500	$101,325
Other forms:				
From Austria-Hungary	660	.....	.....	.....
Great Britain	22,220	.....	27,060	.....
Other countries	660	.....	440	.....
Totals	23,540	$20,651	27,500	$24,125
Boots and shoes:—*pairs*				
From United States	8,419	.....	15,078	.....
Austria-Hungary	1,531	.....	.....	.....
France	88	.....	10,282	.....
Germany	4,224	.....	.....	.....
Other countries	149	.....	140	.....
Totals	14,411	$13,907	25,500	$24,608
Elastic webbing:				
From Austria-Hungary	5,500	.....	.....	.....
France	12,100	.....	14,520	.....
Germany	27,060	.....	880	.....
Other countries	13,640	.....	17,600	.....
Totals	58,300	$76,718	33,000	$43,425
Elastic fabric—not specified:				
From Austria-Hungary	9,460	.....	.....	.....
France	7,480	.....	214,720	.....
Germany	15,180	.....	.....	.....
Great Britain	102,300	.....	85,580	.....
Other countries	4,180	.....	6,600	.....
Totals	138,600	$109,431	306,900	$242,312
Tires:				
From France	194,920	.....	491,040	.....
Germany	2,640	.....	.....	.....
Great Britain	153,780	.....	323,840	.....
Other countries	18,920	.....	24,860	.....
Totals	370,260	$649,638	839,740	$1,473,362
Other rubber manufactures:				
From United States	262,240	.....	897,380	.....
Austria-Hungary	13,640	.....	.....	.....
France	591,140	.....	846,120	.....
Germany	63,140	.....	.....	.....
Great Britain	421,300	.....	506,660	.....
Other countries	2,640	.....	880	.....
Totals	1,354,100	$950,332	2,251,040	$1,579,049
Total Imports	.....	$7,049,353	.....	$9,050,042

EXPORTS OF CRUDE AND MANUFACTURED RUBBER.

	Seven Months Ending July, 1915.		Seven Months Ending July, 1916.	
UNMANUFACTURED—	Pounds.	Value.	Pounds.	Value.
India rubber and gutta percha —raw and reclaimed.....	257,180	$90,247	662,860	$232,604
MANUFACTURED—				
India rubber and gutta percha —threads:				
To Germany	5,720	.....	.....	.....
Great Britain	.....	.....	5,280	.....
Argentina	2,860	.....	3,740	.....
Other countries	31,020	.....	24,860	.....
Totals	39,600	$69,480	33,880	$59,444
India rubber and gutta percha —sheets:				
Cut sheets	9,240	$13,780	3,520	$5,250
Elastic fabric	1,540	608	1,980	782
Insulated wire	1,100	290	660	174
Hard rubber	20,240	14,205	43,780	30,736
India rubber and gutta percha —tubes:				
Cut sheets	2,640	$4,169	9,020	$14,243
Elastic fabric	52,800	27,792	67,540	35,551
Other forms	45,980	28,236	91,080	55,931
Belting	2,420	1,486	1,540	946
Boots and shoes.....*pairs*	50	48	.....	.....
Elastic webbing:				
To France	1,980	.....	5,280	.....
Greece	37,840	.....	60,280	.....
Egypt	3,300	.....	16,500	.....
Argentina	35,420	.....	77,660	.....
Brazil	40,040	.....	69,520	.....
Cuba	22,440	.....	22,220	.....
Other countries	44,000	.....	121,660	.....
Totals	185,020	$243,470	373,120	$490,992
Elastic fabric—not specified:				
To Spain	660	.....	440	.....
Argentina	2,640	.....	15,840	.....
Brazil	.....	.....	220	.....
Uruguay	1,100	.....	1,760	.....
Other countries	2,640	.....	9,900	.....
Totals	7,040	$12,262	28,160	$49,408
Tires:				
To France	109,780	.....	124,960	.....
Great Britain	366,960	.....	2,895,420	.....
Switzerland	215,160	.....	66,220	.....
India and Ceylon.....	243,100	.....	324,720	.....
Australia	16,940	.....	57,860	.....
Argentina	479,160	.....	770,220	.....
Brazil	220,440	.....	452,760	.....
Other countries	2,307,140	.....	376,200	.....
Totals	3,958,680	$6,945,684	5,068,360	$8,892,668
Other rubber manufactures:				
To Great Britain	21,120	.....	39,380	.....
Switzerland	77,440	.....	26,400	.....
Argentina	55,660	.....	61,600	.....
Other countries	192,940	.....	143,220	.....
Totals	347,160	$243,643	270,600	$189,912
Total Exports	.....	$7,695,400	.....	$10,058,641

THE MARKET FOR RUBBER SCRAP.

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NEW YORK.

RUBBER scrap has been firm during the past month, with the principal interest centered in boots and shoes. The upward tendency of crude rubber has had a strengthening effect on the rubber scrap market, and, with few exceptions, boots and shoes are the only commodities that have advanced materially. These show a gain of 3/8 to 1/4 cent over the delivered price quoted a month ago.

The mills are reported to have bought quite heavily in some localities, but the volume of business transacted has not been sufficient to advance prices generally. Supplies are reported to be below the average, and, moreover, it is generally expected that at this time of the year collections will diminish. From the number of inquiries it is believed that the mills are considering replenishing their stocks, which are supposed to be low. Now that rubber mills are in the market for crude rubber there is reason to believe that reclaimers will soon follow, for reclaimed rubber is the principal filler used in rubber manufacture.

BOOTS AND SHOES. That the reclaimers have paid as high as 9 7/8 cents, delivered, for this material is questioned; however, it is reported that orders have been filled at 9 3/4 cents, delivered. Both trimmed and untrimmed arctics were firm at 7 5/8 and 6 1/8, respectively.

AUTO TIRES. Mixed tires have shown the most strength under a fairly good demand at 6 3/4 to 6 7/8 cents, delivered. There has been little interest taken in white G. & G. tires and prices are unchanged. Bicycle and solid tires have moved fairly well during the month and show a slight advance in price.

INNER TUBES. There has been very little doing in the various grades of tubes other than the usual movement in No. 1 grays and reds at prices ruling a month ago.

MECHANICALS. Nothing of importance has developed in this material, although hose received some attention during the month. Prices are about the same as last month.

London imports of waste and reclaimed rubber for October were 167,800 pounds; Liverpool, 30,000 pounds. Exports from London were 971,600 pounds; Liverpool, 465,700 pounds.

NEW YORK QUOTATIONS FOR CARLOAD LOTS DELIVERED.

NOVEMBER 24, 1916.

Prices subject to change without notice.

	Per Pound.
Boots and shoes	$0.09 7/8 @ .10
Trimmed arctics	.07 5/8 @ .07 3/4
Untrimmed arctics	.06 1/8 @ .06 3/4
White tires, Goodrich and Goodyear	.08 1/2 @
Auto tires, standard white	.06 3/4 @ .06 7/8
standard mixed	.06 3/4 @ .06 7/8
stripped, unguaranteed	.04 3/4 @ .05
Auto peelings, No. 1	.09 1/2 @
No. 2	.08 1/4 @
Inner tubes, No. 1	.25 1/2 @ .26
No. 2	.11 1/2 @
red	.11 1/2 @
Irony tires	.02 1/2 @
Bicycle tires	.04 3/8 @ .04 3/4
Solid tires	.05 1/2 @ .05 3/4
White scrap, No. 1	.13 1/2 @ .14
No. 2	.10 @
Red scrap, No. 1	.10 @ .11
No. 2	.08 @
Mixed black scrap, No. 1	.04 1/4 @
No. 2	.04 @
Rubber car springs	.04 1/2 @
Horse shoe pads	.04 3/4 @
Matting and packings	.01 @
Garden hose	.01 3/8 @ .01 3/4
Air brake hose	.06 @
Cotton fire hose	.02 1/2 @
Large hose	.01 3/4 @
Hard rubber scrap, No. 1, bright fracture	.26 @
Battery jars (black compound)	.02 1/2 @
Insulated wire stripping	.03 1/2 @
Rubber heels	.03 1/4 @

THE MARKET FOR COTTON AND OTHER FABRICS.

NEW YORK.

THE cotton market has been subject to violent fluctuations during the past month and 20-cent cotton found ready buyers. The continued improvement in trade demand, combined with active buying in New York by Liverpool interests, were the attributed causes. Late in the month, however, the market became heavily long on both sides of the water and stop order selling was indulged in freely both in New York and Liverpool, on November 23, forcing prices down 96 points—a drop of $4.80 a bale.

The opinion is freely expressed that 20-cent cotton is too high; that the mills are supplied with stocks, and therefore able to stay out of the market for some time. Moreover, it is pointed out that there is no actual shortage just now and only fear of shortage is the market's disturbing factor.

Under heavy buying on November 25, futures advanced 50 points, establishing prices within 11 to 19 points of the recent high record values, and wiping out the losses of $5 to $6 a bale in the interim.

EGYPTIAN COTTON. Fluctuations in Egyptians have been more violent than in the case of Americans. Mail from Alexandria under date of October 23 advises that the market, influenced by the firmness of Americans and that of Egyptians in Liverpool, combined with the reduced Egyptian crop estimates, forced contracts to $30. The spot market has been very active and the volume of business quite fair, with prices about $2 higher than contracts. A record price of $40 was paid for Sakellarides. The tone of the market has been firm, and easier conditions are not anticipated unless some setback should occur.

Total exports from Alexandria for the period, August 1 to October 11, were 47,721 bales, of which Great Britain imported 36,271 bales; the Continent, 8,907; the United States, 2,233 bales; India and Japan, 310 bales.

SEA ISLAND COTTON. Both the Savannah and Charleston markets have been very active during the month and prices have advanced rapidly, showing a gain of 10 cents since our report last month. Heavy buying has been done at 50 cents and holders are asking 55 cents, which will doubtless be obtained should present conditions continue. Savannah stock on November 17 was 10,518 bales, against 13,507 bales a year ago. At Charleston the stock was 767 bales, against 1,149 bales a year ago.

MECHANICAL DUCK. The demand for hose and belting duck has been active; prices have advanced 2 cents a pound during the month and are closely approaching the 40-cent level. While the present prices seem high, the present market trend would indicate higher prices after the first of the year. The duck market has broadened out to a surprising degree, due to the shortage of leather, and manufacturers are substituting cotton duck wherever possible.

SHEETINGS, OSNABURGS, ENAMELING DUCK AND DRILLS. Comparatively speaking, there appears to be a somewhat easier market condition than last month for sheetings and Osnaburgs, although the demand is active at advanced prices and contracts call for March delivery. Drills are in good demand and prices have advanced. The mills have nothing to offer until the end of February. Enameling duck continues firm at advanced prices, with contracts dated May 1, 1917.

TIRE FABRICS. The advance in the price of building fabrics shows a gain of 15 to 20 cents for combed Sea Island and combed and carded Egyptian fabrics. Peelers have advanced 5 cents during the month. That still higher prices in the entire list are confidently expected is based on the belief that the Egyptian market is being manipulated. Sakellarides is higher than Sea Island, an unusual condition. No firm offers were being made, due to the uncertainty of raw materials.

During the last of the month easier market conditions were noted and it was reported that buyers who were prepared to pay the prevailing high prices were accommodated. Possibly some of the large consumers have found it an advantage to release some of their contract deliveries.

That this market is being broadened by the shortage of leather is shown by the substitution of Sea Island fabric for the uppers of ladies' footwear.

However, the tire fabric situation is still under the influence of abnormal raw material conditions that bespeak uncertainty to consumers who are not covered.

NEW YORK QUOTATIONS.

NOVEMBER 24, 1916.

Prices subject to change without notice.

Aeroplane and Balloon Fabrics:			
Wamsutta, S. A. I. L. No. 1, 40-inch	*yard*	$0.32½	@
No. 4, 38½-inch		.32½	@
O/X B. 36-inch		Nominal	
Wool Stockinettes—52-inch:			
A—14-ounce	*yard*	1.25	@
B—14-ounce		1.50	@
C—14-ounce		1.75	@
Cotton Stockinettes—52-inch:			
D—14-ounce	*yard*	.50	@ .55
E—11½-ounce		.42	@ .50
F—14-ounce		.55	@ .60
G— 8-ounce		.48	@ .50
H—11-ounce		.50	@ .55
I— 9-ounce		.42	@ .45
Colors—white, black, blue, brown.			
Knitabac Stockinette	*lb.*	.90	@ .95
Tire Fabrics:			
17¼-ounce Sea Island, combed	*square yard*	1.20	@ 1.30
17¼-ounce Egyptian, combed		1.05	@ 1.15
17¼-ounce Egyptian, carded		1.02	@ 1.12
17¼-ounce Peelers, carded		.65	@ .70
Sheeting:			
40-inch 2.35-yard	*yard*	.15¾	@
40-inch 2.50-yard		.14¾	@
40-inch 2.70-yard		.14	@
40-inch 2.85-yard		.13	@
40-inch 3.15-yard		.12¾	@
Osnaburgs:			
40-inch 2.25-yard	*yard*	.16½	@
40-inch 2.48-yard		.15	@
37½-in. 2.42-yard		.15½	@
Mechanical Ducks:			
Hose	*pound*	.38	@ .39
Belting		.37½	@ .38½
Carriage Cloth Duck:			
38-inch 2.00-yard enameling duck	*yard*	.19½	@
38-inch 1.74-yard		.21⅝	@
72-inch 16.66-ounce		.43	@
72-inch 17.21-ounce		.44½	@
Drills:			
38-inch 2.00-yard	*yard*	.18½	@
40-inch 2.47-yard		.15	@
52-inch 1.90-yard		.20	@
52-inch 1.95-yard		.19½	@
60-inch 1.52-yard		.25⅝	@
Yarns:			
Garden Hose, 12/2 cabled	*pound*	Nominal	
Fire Hose 12/1		Nominal	
Imported Woolen Fabrics Specially Prepared for Rubberizing—Plain and Fancies:			
63-inch, 3¼ to 7½ ounces	*square yard*	.38	@ 1.55
36-inch, 2¾ to 5 ounces		.35	@ .85
Imported Plaid Lining (Union and Cotton):			
63-inch, 2 to 4 ounces	*square yard*	.35	@ .75
36-inch, 2 to 4 ounces		.25	@ .50
Domestic Worsted Fabrics:			
36-inch, 4½ to 8 ounces	*square yard*	.32½	@ .57½
Domestic Woven Plain Linings (Cotton):			
36-inch, 3¾ to 5 ounces	*square yard*	.15½	@ .20
Raincoat Cloth (Cotton):			
Bombazine	*yard*	.08	@ .08½
Twills		.12	@ .18
Tweed		.25	@ .35
Tweed, printed		.07½	@ .15
Plaid		.08½	@ .10
Repp		.24	@ .27
Burlaps:			
32—7½-ounce	*100 yards*	7.20	@
40—7½-ounce		8.50	@
40—8-ounce		8.75	@
40—10-ounce		10.00	@
40—10½-ounce		10.25	@
45—7½-ounce		9.60	@
45—8-ounce		9.75	@
48—10-ounce		12.50	@

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS.

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GENERALLY speaking, the demand for rubber chemicals has been active during the past month with a strongly marked tendency toward higher prices. Business has been good, inquiries for the most important ingredients in the list have been numerous, and the indications are that manufacturers have been buying freely. The well-known shortage of ocean bottoms has resulted in delayed arrivals of foreign materials and there appears to be no assured relief in the immediate future. The situation, moreover, is complicated by domestic freight embargoes due to car shortage and congestion in certain shipping points. While these conditions prevail it will be obviously difficult to secure prompt supplies of rubber chemicals.

ACCELERATORS. Hexamethylene Tetramine is one of the new organic vulcanizing accelerators that have attracted considerable attention recently. It is quoted at 65 cents a pound in lots of not less than 100 pounds.

BARYTES. Prices have advanced under the steady demand for this material and further advances are confidently expected within the next three months.

DRY COLORS. All grades have been firm, due to scarcity of the basic materials. Chrome yellows and greens are exceptional in that they are comparatively low in price. Adulterated colors are at present bringing unusually high prices.

ZINC OXIDE. Contract prices on American process, "Horse Head," brands for the first half of 1917 are the same as a month ago. French process, green, red and white seal have advanced 4 cents, respectively.

NEW YORK QUOTATIONS.

NOVEMBER 27, 1916.

Subject to change without notice.

Acetone (drums)	lb.	$0.23	@
Acid, acetic, 28 per cent. (bbls.)	lb.	.03½	@ .04
cresylic (crude)	gal.	1.00	@
glacial, 99 per cent (carboys)	lb.	.18	@ .25
muriatic, 20 degrees	lb.	.01¾	@
nitric, 36 degrees	lb.	.04½	@
sulphuric, 66 degrees	lb.	.01½	@
Alumina Pigment, No. 1 (sacks)	ton	16.00	@
Aluminum Flake (carloads)	ton	20.00	@22.00
Ammonium carbonate	lb.	None	
Antimony, crimson, sulphuret of (casks)	lb.	.50	@ .65
crimson, "Magmetco"	lb.	Nominal	
crimson, "Mephisto" (casks)	lb.	.55	@
golden, sulphuret of (casks)	lb.	.30	@ .35
golden, "Magmetco"	lb.	Nominal	
golden, "Mephisto"	lb.	.30	@
golden, sulphuret, States brand, 16-17 per cent.	lb.	.35	@
Asbestine	ton	15.00	@40.00
Asbestos	ton	50.00	@
Asphaltum "G" Brilliant	lb.	.03½	@
Barium sulphate, precipitated	ton	100.00	@
Barytes, pure white	ton	30.00	@33.00
off color	ton	18.00	@22.50
Basofor	ton	100.00	@
Benzol, pure	gal.	.60	@
Beta-Naphthol	lb.	1.00	@ 1.15
Brown, sienna, raw powdered	lb.	.04	@ .06
umber, raw powdered	lb.	.03	@ .03½
Bone ash	lb.	None	
black	lb.	.04	@ .08
Cadmium ri-sulphate (f. o. b. London)	lb.	2.75	@
sulphide, yellow	lb.	2.00	@ 2.20
Cantella gum	lb.	.33	@ .38
Carbon, bisulphide (drums)	lb.	.05	@
black (cases)	lb.	.18	@ .20
tetrachloride (drums)	lb.	.18	@
Caustic soda, 76 per cent	lb.	.05	@
Chalk, precipitated, extra light	lb.	.04½	@ .05¼
precipitated, heavy	lb.	.03¾	@ .05
China clay, domestic	ton	25.00	@
imported	ton	45.00	@
Chrome, green	lb.	.35	@ .50
yellow	lb.	.25	@
Cotton linters	lb.	.07½	@
Fossil flour	lb.	.01	@ .02
Gas black	lb.	.20	@ .25
Gilsonite	ton	40.00	@42.50
Glue, high grade	lb.	.25	@ .33
medium	lb.	.22	@ .23
low grade	lb.	.20	@ .21
Glycerine, C. P. (drums)	lb.	.32½	@
Graphite, flake (400 pound bbl.)	lb.	.14	@
powdered (400 pound bbl.)	lb.	.07	@
Green oxide of chromium (casks)	lb.	.75	@ .85
Ground glass (fine)	lb.	.02¼	@
Hexamethylene Tetramine	lb.	.65	@
Indian red, reduced grades	lb.	.04½	@ .08
pure	lb.	.08½	@ .09
Infusorial earth, powdered	ton	60.00	@
bolted	ton	65.00	@
Iron oxide, red, reduced grades	lb.	.02¼	@ .03½
red, pure, bright	lb.	.08½	@ .09
Ivory, black	lb.	.16	@ .30
Lampblack	lb.	.05	@ .08
Lead, red oxide of	lb.	.09¼	@
sublimed blue	lb.	.08¼	@
sublimed white	lb.	.08¼	@
white, basic carbonate	lb.	.08¾	@
white, basic sulphate	lb.	Nominal	
black hyposulphite (Black Hypo)	lb.	.45	@ .75
Lime, flour	lb.	.01½	@
Litharge	lb.	.09½	@ .09¼
English	lb.	.12	@ .14
sublimed	lb.	.09½	@
Lithopone, imported	lb.	Nominal	
domestic	lb.	.07	@
Beckton white (carloads)	lb.	.06½	@
Magnesia, carbonate	lb.	.12	@
calcined, heavy	lb.	.10	@
heavy, Thistle Brand	lb.	.14	@
light	lb.	.50	@
Magnesite, calcined, powdered	ton	35.00	@39.00
Mica, powdered	lb.	.03½	@ .05
Mineral rubber	lb.	.01	@ .02
"M. R. X."	ton	100.00	@
"Genasco"	ton	36.50	@
"L. M. R."	ton	50.00	@
"Richmond Brand"	lb.	.03	@
"No. 64 Brand"	ton	35.00	@
"Refined Elaterite"	lb.	.07	@
"Rubrax"	ton	35.00	@
Naphtha, stove gasolene (steel bbls.)	gal.	.22	@
66@68 degrees (steel bbls.)	gal.	.27	@
68@70 degrees (steel bbls.)	gal.	.28	@
V. M. & P. (steel bbls.)	gal.	.21	@
Oil, aniline	lb.	.23	@ .24
corn, refined	cwt.	13.51	@
linseed (bbl.)	gal.	.99	@
palm	gal.	.10½	@
paraffin	gal.	.17	@
pine (cases)	gal.	.63	@
rapeseed	gal.	1.00	@ 1.05
rosin, heavy body	gal.	.36	@
tar (cases)	gal.	.21½	@
soluble aniline colors, yellow, orange, red, violet, blue, green	lb.	Nominal	
Orange mineral, domestic	lb.	.12	@
Paragol (carloads)	cwt.	10.90	@
Petrolatum	lb.	.06½	@
Petroleum grease	lb.	.04¼	@
Pine solvent		None	
Pine tar	bbl.	8.50	@
Pitch, burgundy	lb.	.03½	@ .04½
coal tar	bbl.	4.50	@
pine tar	bbl.	10.00	@
Plaster of paris	lb.	1.50	@ 1.70
Prussian blue	lb.	1.00	@ 1.75
Pumice stone, powdered (bbls)	lb.	.03	@ .04
Resin, Pontianak, refined	lb.	None	
granulated	lb.	None	
fused	lb.	None	
Rosin (280 pound bbls.)	bbl.	6.75	@ 8.50
Rotten stone, powdered	lb.	.02½	@ .04
Rubber black	lb.	.06	@
Rubber substitute, black	lb.	.08½	@ .11
white	lb.	.13½	@ .17½
brown	lb.	.13	@ .18
Rubbide		Nominal	
Shellac, fine orange	lb.	.42	@ .45
Silex (silica)	ton	20.00	@36.00
Soapstone, powdered	ton	8.50	@15.00
Starch, corn, powdered	lb.	.04	@ .04½
Sulphur chloride (drums)	lb.	.09	@ .09½
Sulphur, flour, velvet, brand (carloads)	cwt.	2.15	@
Bergenport, brand	cwt.	2.75	@
Talc, American	ton	12.00	@15.00
French	ton	22.50	@30.00
Toluol, pure	gal.	3.00	@
Tripolite earth, powdered	ton	60.00	@
bolted	ton	65.00	@
Turpentine, pure gum spirits	gal.	.46	@
wood	gal.	.48½	@
Venice	gal.	.11	@ .12
Ultramarine blue	lb.	.15	@ .50
Vermilion, brilliant	lb.	.85	@
Chinese	lb.	.95	@ 1.00
English	lb.	1.50	@ 1.75
Wax, beeswax, white	lb.	.48	@ .50
ceresin, white	lb.	.12½	@ .20
carnauba	lb.	.28	@ .45
ozokerite, black	lb.	.60	@ .65
green	lb.	.80	@ .85
montan	lb.	.27½	@ .30
paraffin, refined 118/120 m. p. (cases)	lb.	.05½	@ .06
123/125 m. p. (cases)	lb.	.06	@ .06½
128/130 m. p. (cases)	lb.	.08½	@ .09
133/136 m. p. (cases)	lb.	.09½	@ .12
crude, white, 117/119 m. p. (bbls.)	lb.	Nominal	
yellow, 124/126 m. p. (bbls.)	lb.	.06½	@
Whiting, Alba	cwt.	.65	@ .85
commercial	cwt.	.90	@
gilders	cwt.	1.08	@
Paris, white, American	cwt.	1.15	@
English cliffstone	cwt.	1.25	@ 1.60
Wood pulp XXX (carloads)	ton	Nominal	
Yellow ochre (Satin)	lb.	.02¼	@
india rubber	lb.	1.25	@
Zinc oxide, American process, horsehead brand			
"special" f. o. b. factory	lb.	.10½	@
"XX red" f. o. b. factory	lb.	.10	@
French process, green seal..f. o. b. factory	lb.	.16¼	@
red seal....f. o. b. factory	lb.	.16¼	@
white seal..f. o. b. factory	lb.	.17¼	@
Zinc substitutes	lb.	.01½	@
Zinc sulphide, pure	lb.	.15	@

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